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With undoubted inaccuracy it is related that the United States Fish Commission, casting about for an expedient to mitigate the bony structure of the shad, once crossed the breed with jelly fish, and obtained thereby a bony jelly fish. This parable is suggested by the anti-rebate plan of the New York Board of Trade and Transportation, which sees a simple and efficacious remedy for discrimination in vesting the Interstate Commerce Commission with authority to fix a discriminatory rate as the maximum which may be charged for one year by the offending carrier. When the New York organization first brought forward this happy thought, its attention was promptly called to the fact that its new maximum rates would affect not merely the specific road that had sinned, but all others competing with it, since the wicked, pilloried rate would get all the business until it was met. In answer to this, the suggestion is now made, in a draft of proposed legislation, that the innocent roads who have been made to suffer by the establishment of such a maximum rate on the lines of a competitor, shall be allowed to collect damages by suit at law: "—nothing in this act shall preclude any party injured from instituting and maintaining an action at law for the recovery of damages against the road, corporation or carrier making an unlawful rebate or discrimination." We may add that nothing in the common law at present precludes any carrier from instituting suit to recover damages in such a contingency, yet, in practice, the remedy remains unsought. It is noteworthy that the Attorney-General indorsed this plan of a pilloried discriminatory rate, without apparently so much as considering the effect on competitors.

From the standpoint of the superintendent—through whose eyes we must look if we are to consider effectual remedies—the radical defect in the engineman at Baker Bridge, without doubt, was his inexperience; and the collision three days later at East Everett (reported on another page) appears to have been due to the errors of another engineman with the same defect. We are not informed as to the record of this second negligent runner, but the fact that the master mechanic cautioned him to be careful, because it was a rainy night, telling him to make sure that no accident occurred, betrays a lack of confidence in his competence. In both cases these comparatively green men were running helping engines. Do we sometimes overlook the fact that though "helper," as defined in the dictionary, means a secondary person, it in reality here means the person of first importance? The runner of the leading engine of a double-header cannot be made secondary. To be such he must put his engine behind the other one. The superstition that because a disaster occurred on the Boston & Maine Nov. 26 there must needs be two more within a few days (there was a bad butting collision of freights on a New Hampshire division of the road on the 26th) may or may not have had its usual prominence in the gossip of the cabooses; but whether there were three, or three dozen, this one element of the remedy is as plain as a pikestaff. Many of the most vital features of an engineman's training seem to be gained only by the slow growth that we call experience. The best book-examination in the world is in many of its features little more than an index, to guide the examiner in looking as far as possible into the candidate's habits of mind. It is true that a man does not experience the difference between fast-train work and slow-train work until he actually tries the fast train; neither can a helper know the responsibility of a leader until he actually leads. It is also true that the happy balance between education by observation and education by doing the actual work is not always easy to manage. The benefit of an adviser in the cab with a young runner soon finds its limit. But the fact that a duty is difficult does not relieve us from doing it. A man of fair intelligence who fires for six years is very likely to learn nearly everything that is necessary to make him a good engineer, so far as it is possible to learn by looking; but to have the assurance that he knows quite everything that the rules require, we must do more than count months on the calendar. It may require the careful assignment of each fireman to different classes of trains, perhaps on different divisions; his regular examination on his acquirements, and this probably more than once a year for three years; a similar carefully prescribed variety of assignments when he becomes a runner; and, perhaps, service under a monitor for a number of runs. We have used "perhaps" and other qualifying words because of the different kinds of men to be dealt with. Bright men learn

without much teaching; but in default of brightness the teaching is a necessity. Is there any escape from this conclusion?

A STANDARD COUPLER.

In 1904, in his annual address to the Master Car Builders' Association, President Brazier recommended the adoption of a standard coupler. Last June the standing committee on coupler tests, acting on this suggestion, recommended the appointment of a special joint committee of members of the association and of representatives of the coupler manufacturers to consider what could be done toward bringing about this much-needed but most difficult standardization. The Executive Committee of the Association appointed, on August 14, six members of the Association and five representatives of the coupler manufacturers, as follows: F. W. Brazier, New York Central, Chairman; T. S. Lloyd, Rock Island; J. T. Chamberlain, Boston & Maine; R. P. C. Sanderson, Seaboard Air Line; A. Stewart, Southern Railway; C. E. Fuller, Chicago & Alton; S. L. Smith, National Malleable Castings Co.; S. P. Bush, Buckeye Steel Casting Co.; H. C. Buhoup, McConway & Torley Co.; W. L. Jacoby, Latrobe Steel & Coupler Co.; F. D. Huntley, Gould Coupler Co. On December 11 they held their first informal meeting in New York. They have a hard task ahead of them.

We pointed out in these columns more than a year ago (August 5, 1904) the need of a standard coupler and the saving which would eventually be made possible by its adoption. As time goes on the need for standardization grows greater and the difficulty of bringing it about grows less. Five years ago there were perhaps more than 30 different makes of couplers. To-day 95 per cent. of the business is confined to less than a dozen makers, and not more than six or seven of these are making couplers that conform in whole or in part to all of the requirements prescribed by the Association. The whole responsibility rests with these few manufacturers. The railroad interests are unanimous in wanting a standard coupler.

Will those of the manufacturers who own patents on coupler details, which are essential in designing a standard, combining the best qualities of all of them, undertake to make a plan for pooling their patents? There are many ways of doing this: They may interchange licenses, they may go farther and pro-rate outputs, they may go still farther and form a combination. To quote from President Hadley: "Trusts are dangerous, but not necessarily injurious."

It is hopeless to attempt to design an entirely new coupler unless they do so, for it would conflict at points with existing patents.

The work of the committee must wait on the action of the manufacturers, while at the same time the manufacturers need the experience, advice and assurances from the railroad men, for they will meet with opposition by some of their associates, and the Committee's support will aid them to accomplish this important step. Further work on the part of the committee would be useless. There is sure to be some remonstrance on the part of the manufacturers to waiving rights which are one of the most valuable parts of their assets, and possibly it may be so concerted and strong as to prevent any further consideration of the question just now. How strong it may be will develop when the committee meets for the first time. There can be no just complaint if the manufacturers protest against a measure which, if carried out, they could claim would deprive them of a greater part of the profits, theirs by right, which they now enjoy from the conduct of their legitimate business. Their products have survived the elimination trials of service, and are satisfactory each in themselves. Each company has a large sum invested in patterns, foundry equipment, fitting rooms, etc., suitable only for the particular type of coupler which it makes; and more than this, its employees have learned from long experience every detail of the manufacture of that one coupler, knowledge which would have to be learned all over again if the company should abandon its own make of coupler for a standard of different design. If all the makers are willing to begin afresh on an equal basis, with or without a pool or agreement to pro-rate the output of each plant on an equitable basis, and thus practically eliminate competition, then the first great stumbling block will be removed. There must be perfect harmony and good will all around. There is the precedent to follow which was established in 1887 when the Association adopted the Janney type of coupler as standard, but then only one maker waived rights. Now there are several competitors who must do likewise, and each is sure to suffer some pecuniary loss at first. The question must be looked upon purely as a matter of business policy, not philanthropy or generosity.

If, however, all agree to waive patent rights, there still remains the design of a standard coupler, mechanically perfect and meeting every service requirement of the present and the future. This in itself will be no easy task. Whatever design is made, it should have no weak points to be discovered later when the coupler is put in actual use. There is no need to hurry in the matter, and as far as possible every condition of future service should be anticipated and provided for. If the coupler makers will contribute their knowledge of the details of manufacture and material and the members of the Association will suggest essential points from their observation and records of couplers in service the committee will have all of the data necessary to begin on the design of a standard. They would have a free hand in designing mechanical details and should be given every opportunity of testing the design under the most severe conditions in service. When every one is satisfied then the Association could safely adopt it as standard.

THE UNION PACIFIC AND THE C., M. & ST. P.

The Union Pacific and the Chicago, Milwaukee & St. Paul are to-day examples of two very different kinds of railroads. The Union Pacific is a great through line; the St. Paul, a strong and compact local railroad. The Union Pacific was built with the one idea of connecting the east with California and the Pacific coast, and it is therefore not strange that it is still above everything else a through route. It has a through line from Omaha to Ogden, Utah, thence over the old Central Pacific to San Francisco; also a through line from Kansas City via Denver to a connection with the Omaha-San Francisco line at Cheyenne, Wyoming, and over the Oregon Short Line and the Oregon Railroad & Navigation, a through route from its main line in western Wyoming to Spokane, Washington, and Portland, Oregon. The efforts of its present owners have been directed first and foremost to the acquisition and improvement of main lines. The reorganized Union Pacific was formed in 1897 with the Oregon Short Line under its control. In 1899, entire control of the Oregon Railroad & Navigation Company, previously held jointly by the Northern Pacific, Great Northern and Union Pacific was acquired, bringing the whole through route to Portland into direct control. In 1901, the Southern Pacific with its thousands of miles of line was bought, primarily to obtain control of the Central Pacific, the Ogden-San Francisco connection. This was simply saying louder than words that the Union Pacific must command its own through line to California. Control of the Southern Pacific also carried with it ownership of the only through line between San Francisco and Portland. These represented main line acquisitions. At the same time a policy of main line improvement was steadily and expensively carried out. In less than two years (1899-1900) the old Union Pacific main line through Wyoming was radically rebuilt. This involved abandoning over one-third of the old roadbed, the building of 159 miles of entirely new line, and great savings in distance, grades and curvature. More recently the Ogden-Lucin cut-off across the Great Salt Lake was accomplished in spite of great difficulties and repeated failures. This enormously expensive piece of railroad building was carried out for the sole purpose of saving a certain amount of main line distance and a large amount of expense of main line operation on the San Francisco route. Main line improvement of this thorough-going sort was carried on on all parts of the system. As a result the Union Pacific has its main lines to-day in splendidly efficient shape.

Meantime, although some branches were acquired or built, branch line construction had, as a rule, to give way to the all important object of securing first-class main lines. The map of the road proves this plainly enough. West from Omaha on the north side of the main line there are only three branch line junctions in the 1,068-mile stretch between Council Bluffs and Pocatello, Idaho, on the Oregon Short Line. These three are all within less than 200 miles of Omaha, so that in the 872 miles from Kearney, Nebraska, to Pocatello, there is not a single mile of feeders to the north. On the south, with the exception of the connection with the Kansas line, 38 miles west of Omaha, which includes a 53-mile branch, and the two Denver connections at Julesburg and Cheyenne, there is not a branch line of any sort in the 854 miles between Omaha and Granger, Wyoming, the junction with the Oregon Short Line. On the south side of the Kansas City-Denver line there is only one branch line, 36 miles long. On the north side of the Central Pacific from the Great Salt Lake to the Pacific slope of the Sierra Nevada mountains the nearest approach to a branch line is a short cut-off in western Nevada. From Tehama, California, to

Eugene, Oregon, 436 miles, the Southern Pacific's San Francisco-Portland line has not a single branch. Clearly, main, rather than branch line development has been the Harriman policy in the northwest. Contrast the map of the Chicago, Milwaukee & St. Paul or the Chicago & North-Western, for instance, and the results are by contrast most clearly evident. Financially, this policy of bringing main lines to a very high standard of efficiency has already proved itself remarkably successful. There is no road in the United States which has of late shown more surprising increases in earnings than the Union Pacific. The raising of the dividend rate on the common stock last summer to 5 per cent. represented only a small part of the increases in earnings. The surplus from recent current earnings has in certain months been at the rate of from 15 to 20 per cent. annually, and for the year ended June 30 was 11.40 per cent. upon the common stock. So far as the present is concerned, the Union Pacific's policy of main line rather than branch line development may be put down as wonderfully successful.

Most of the railroads which now form the Chicago, Milwaukee & St. Paul were built as local railroads to serve local centers. There was little idea of their being eventually part of a through route. The road was originally the Milwaukee & St. Paul, even a Chicago connection being not a first consideration in its history. There is a suggestion of the number of original independent railroads which it now includes in the five railroad companies whose names began with Dubuque, nine whose names began with Chicago, and 16 which had Milwaukee as their real or alleged starting point, which are among the component parts of the present Chicago, Milwaukee & St. Paul road. This process of consolidation is likely to have been obscured in the public mind by the fact that the Chicago, Milwaukee & St. Paul has no leased lines nor permanent subsidiary companies, all such lines being as soon as practicable absorbed outright into the system. There is no way to get an idea of the extent of the road's branches, feeders, connecting and main lines, except by studying the map. They cover the splendid traffic territory northwest of Chicago, reaching as far north as Fargo, North Dakota, and as far west as Evarts and Chamberlain on the Missouri river in South Dakota, with three other north and south branches from the South Dakota line into North Dakota and multitudinous connections and short branch lines throughout the rest of the territory. In the St. Paul's case, development of branch lines rather than main lines has plainly been the established policy. Like the opposite policy on the Union Pacific it has been remarkably successful in financial results. Seven per cent. dividends are regularly paid on both preferred and common stock and gross earnings increased last year a million and a half dollars over 1904.

Here, on two railroads in adjoining territories, is an exceedingly interesting contrast in general theory of construction and operation, with the added fact that the two opposite policies have each been most successful. The Union Pacific has subordinated everything to through business; the St. Paul has spent its main efforts in building up its hold on local territory. Primarily, the reason for this difference is, of course, the difference in the country through which the two roads run. Along with the settler, the ranchman, the farmer and, last of all, the manufacturer, the St. Paul has occupied Wisconsin, Minnesota, Iowa and the Dakotas as far west as the Missouri river. A corresponding westward movement of population has not yet reached most of the Union Pacific's territory. Up to a very recent time the country through which it runs has been only a barrier between the Missouri valley and the Pacific coast.

Recent happenings are significant of the movement of population in the United States and of the fact that the two roads have each learned something from the example of the other. An era of competitive railroad building has been predicted by the President of the Union Pacific. Following close upon this prediction, the directors of the Chicago, Milwaukee & St. Paul have formally authorized the building of an extension to the Pacific coast. Each road apparently plans to supplement its present strength by matching the policy of the other. The Union Pacific has splendid through lines and a wonderfully profitable through traffic, yet, looking toward the future, it needs feeders and the development of its own local territory. The St. Paul has numbers of local lines reaching local territory already profitable and with immense future possibilities, yet it lacks, and has come to lack more and more, the profits which come from a through line and through business.

The Union Pacific's plans are generally understood to have as their central object the rounding out of the present territory of the Harriman lines by building branches, feeders and connecting lines. As one correspondent puts it, "Branch lines are what Mr. Harriman is after." The following statement in the annual report of the company just issued is the first official announcement in this direction:

> "The expenditures for betterments and additions in past years have been principally for the main lines and a considerable outlay is now necessary to bring the condition of the branch lines up to relatively the standard of the main lines. Towards these improvements $500,000 has been appropriated from this year's income.
>
> "In order to develop and protect the territory tributary to and served by these lines, there has been authorized, since the close of the fiscal year, the construction of about 320 miles of new railroad, estimated to cost, including equipment, about $12,000,000, and other important extensions are under consideration."

Within a week, the director of maintenance and operation of all the Harriman lines has announced a program of branches and extensions, projected or under way, totaling 863 miles of new line. Of this, 201 miles are to be built by the Union Pacific, 140 by the Oregon Short Line, 135 by the Oregon Railroad & Navigation Company, and 387 miles by the Southern Pacific.

There is no doubt about opportunities for future railroad development in Nebraska, Kansas, Wyoming, Utah, Nevada and Oregon. A line striking east from the Southern Pacific's San Francisco-Portland line, across central Oregon, such as is likely to be one of the Harriman projects, would cross a railroadless territory larger than all New England. North of the Union Pacific main line in Wyoming is an unoccupied territory almost as large. Idaho has only one mile of railroad to every 57 square miles of territory (New York has one mile of road for every 5.7 square miles), and with the exception of its northern rim next the international boundary is all tributary to the Oregon Short Line and Oregon Railroad & Navigation. Besides these territorial empires open to invasion, there are numbers of local points where branch lines will at once or very soon be profitable feeders. The Union Pacific has not, we believe, suddenly awakened to opportunities of which it has been either neglectful or ignorant. It has first of all devoted every effort to bringing main lines to the highest point of efficiency. As a result, the company's credit, on which new railroad building with profit largely depends, has grown strong even faster than main-line roadbed. For a railroad which less than nine years ago was in receivers' hands, the Union Pacific has come into a remarkable prosperity. It is to-day wonderfully prepared for a railroad building campaign.

The purpose of the St. Paul to build to the coast has been believed for some time to exist, but up to the recent formal action of the directors it has never been in any way officially announced. Examination of the facts of the case makes it seem surprising that the actual beginning of work on this extension comes so late. As was shown in the review of the annual report of the road in the *Railroad Gazette*, October 20, the St. Paul has been getting all too small an average freight haul. With a mileage of nearly 7,000 miles it carried its typical ton of freight in 1904 only 185 miles. Last year, with over 7,000 miles of line, the average haul was only 175 miles. The average haul on the Union Pacific is 386 miles, more than twice as long, and increased last year 33 miles over 1904. For the St. Paul to be carrying freight on the average less than one-thirty-fifth of the total mileage must in itself have been argument enough to determine the directors upon a line to the Pacific coast. The St. Paul, as it stands to-day, is an aggregate of local railroads—strong, well situated and more than self-supporting, but nevertheless primarily local roads. With what must be trifling exceptions, a haul of less than 500 miles is the longest which it receives on trans-continental freight west, northwest or southwest from Chicago. Council Bluffs, Minnesota Transfer and Kansas City—all within 500 miles of Chicago—are the St. Paul's present trans-continental terminals. If the road were receiving all or the largest part of the freight passing through these gateways, so short a haul could perhaps be permanently endured. There are, however, between Chicago and Omaha seven other competing routes and between Chicago and either St. Paul or Kansas City at least six other competitors. If it were known exactly how much of the freight through these gateways is now being carried by the St. Paul it would probably be found that the proportion is not large compared with the tonnage of some of the other roads, and that it has of late been proportionately decreasing. To and from Tacoma and Seattle, which are to be the Pacific terminals of the new extension, the St. Paul will get a haul of over 2,000 miles instead of less than 500, and will be one of three instead of seven or eight competing routes. Is it any wonder that years have been spent in planning the most available through route for a Pacific outlet?

This matter of securing a longer haul and a larger amount of through traffic may be considered the present and compelling reason for the extension, yet, if the past development of the west proves anything, it proves that as great advantages will probably

ultimately come from local traffic to be developed along the new main line. With the experience of the St. Paul management in developing local territory by branch lines, it is not likely that they will be content with a main line and nothing more. In fact, it has been unofficially announced that along with the Pacific extension something over 1,000 miles of branch lines are already included in the construction plans. The possibilities of the territory between Evarts and Puget Sound are strong arguments for branch line construction. Up to this summer the Missouri river has been the western boundary of east and west lines in South Dakota. The moment the Missouri is bridged at Evarts, the St. Paul will strike into a territory as large as the state of New York, not mountainous and untouched by a single railroad, which would, with railroad facilities at the same rate as Massachusetts, contain some 13,000 miles of road. This covers the adjacent portions of North Dakota, Montana, Wyoming and South Dakota, bounded by the Northern Pacific on the north and west, the Burlington's Montana line and the Chicago & North-Western's extension now under way from Pierre, South Dakota, to Rapid City, on the west and south, and the Missouri river on the east, including some 50,000 square miles. This accounts for less than 400 miles of the Pacific extension. Further west it will undoubtedly reach the mining regions of Montana and run through the undeveloped fertile country in the north of Idaho. The richest of the territory through which it is to pass is said to be in the State of Washington. The precise route of the extension has not yet been made public, but these are some of its possibilities.

The length of the new main line from Evarts to Seattle has been variously estimated at from 1,200 to 1,700 miles. On the Great Northern, Minot, and on the Northern Pacific, Bismarck, North Dakota, correspond roughly with Evarts, South Dakota, in distance from Seattle. By ruler measurement, it is 975 miles from Minot to Seattle. The Great Northern takes 1,302 miles to cover the distance. Bismarck is 1,000 miles air-line from Seattle; by the Northern Pacific, 1,468 miles. That is, the Great Northern takes to reach the coast one-third, and the Northern Pacific nearly one-half as much again as the air line distance. From Evarts, the starting point of the St. Paul's new line, the air line distance is 1,040 miles to Seattle. The St. Paul's line will proportionately probably not be quite as short as the Great Northern, nor quite as long as the Northern Pacific. If it requires two-fifths more than the air-line distance to reach the coast, it will be 1,456 miles long. The fact that the other roads had earlier choices of all possible locations may somewhat increase this amount. Assuming that the new extension will be 1,500 miles long, the distance by it from Chicago to Seattle via Milwaukee and La Crosse, Wisconsin; Hastings, Minnesota, and Evarts, South Dakota, will be 2,296 miles as against 2,260 miles from Chicago to Seattle by the Burlington and Great Northern, and 2,340 miles from Chicago to Tacoma by the Burlington and Northern Pacific. The new line will be the longest single piece of railroad under construction in the United States, about 500 miles longer than the Western Pacific, to be built from Salt Lake City to San Francisco. Terminal property in Tacoma and Seattle has been acquired along the water front and a right of way from the Columbia river across the state of Washington secured by the Pacific Railroad, of which the late General Manager of the St. Paul is President. Following its usual policy of concentration, it is probable that the whole line will be built directly by the St. Paul company instead of by subsidiary companies to be taken over on completion of their respective lines. When the whole extension is finished, it will make the Chicago, Milwaukee & St. Paul in the north as the Atchison, Topeka & Santa Fe is in the south, the only road running over its own rails from Chicago to Pacific tidewater.

The characteristic thing about this project is the fact that success seems solidly secured before a rail is laid on the 1,500 miles of new line. From the moment of its completion, through business over it should make it exceedingly profitable. Once built, it cannot fail to develop an increasing amount of local traffic. The territory through which it is to run is probably the best undeveloped territory in the country, and the coming of the St. Paul should mean progress to very large undeveloped areas. In the old days, railroads built west into the prairie country hoping to develop traffic fast enough to live through the lean years while the country was being settled up. To-day the prosperity of the Pacific coast makes it possible for a railroad to project a 1,500-mile link with the practical certainty that through business over it will make it pay from the start, and that local business can be at once developed to make it increasingly profitable. The Union Pacific, though in another way, is in the same fortunate situation. There can be no question but that branch lines can be built with profit at various points on the Harriman lines. It is striking to observe the way in which each road is starting upon a campaign of railroad building based upon the long established policy of the other.

The Montreal Express of the Boston & Maine dashed full speed into a local train that was standing at Baker Bridge station, near Lincoln, with the result that 10 were killed and many injured. The local train caught fire, and some of the passengers, it appears from the account, must have been literally roasted to death—than which nothing more awful can be imagined. An effective block system is what is required, as such a system would reduce the possibilities of an accident nearly to nothing. Yet because the block system would be a little more costly, and at times slower than the present system, many of the railways will not adopt it, and prefer to take chances. The Canadian Railway Commission has been inquiring into the cases of railroad accidents, and is understood to be prepared to insist upon the block system or something like it being universally adopted in Canada. The sooner something of this sort is done the better will it be for the lives and limbs of the traveling public. We have been harrowed too long and too often by preventable railroad horrors, which are the cause of much widespread misery and suffering. The rule of holding trains at a station until a train preceding has arrived at the next station ahead would have prevented this accident. The Canadian Pacific insists upon this rule being kept.—*Montreal Witness.*

The block system, "or something like it," is what the Canadian Railway Commission proposes to demand. Whether or not this statement is official we do not know; but it will be recalled that public officials in this country have in their official utterances betrayed the same indistinct notion of what the block system is. There is not anything like it! It is *sui generis.* It is so simple that laymen who are otherwise intelligent seem to stumble over it. To keep each train at A until the one ahead of it has reached B is a proposition which any man ought to comprehend at sight; and that is all there is to it. Perhaps railroad men are to blame for unnecessary mystification, because so much of their talk on the subject is in other than simple terms. Apparently the principal reason why railroad men put so much dignity, detail and darkness into their talk about signals is that the apparatus costs a good deal of money; but that is no reason for wanton or thoughtless sacrifice of simplicity. When one has approved a big appropriation which causes momentary inward groanings it is natural to try to impress the office force with the dignity and importance of what has been done; but in this case there is danger of fictitious importance. The block system has a dignity of its own; and this is not impaired by its simplicity.

The action of the Railroad & Warehouse Commission of the State of Illinois in ordering a horizontal reduction of 20 per cent. in the freight rates of the railroads of that State is so radical, and has such a spectacular air that it will be necessary to see how the order is carried out before forming an opinion concerning its reasonableness. The Commissioners have been "considering" the question for two or three years, but in such an indecisive way that no one has been able to guess what their reflections would amount to. Now it is said that they have acted because the Governor desired them to act. It is said that inequalities in rates are sufficiently common to justify some action by the State, but no one seems to have taken the pains to set forth reliable evidence on this point. The probable decrease that this order will cause in the earnings of the principal roads has been guessed at by reporters and others, and these estimates have been printed, but they are so vague as to be utterly worthless. One reporter says that some of the roads will "take their medicine" rather than tackle the task of making a suitable protest before the Commission.

The bill to require the use of the block system on all the passenger railroads of the United States, which was introduced in Congress a year ago by Representative Esch, of Wisconsin, (*Railroad Gazette*, Feb. 10, 1905, page 114) has been again introduced in the Fifty-ninth Congress and is numbered H. R. 3063. The substance of Mr. Esch's new bill is pretty nearly the same as that of a year ago, except that the dates in the second, third and fourth sections have been changed. The bill now requires, in brief, the use of the block system on one-fourth of every railroad by July 1, 1908; one-half by July 1, 1909; three-fourths by July 1, 1910, and the whole of the road by July 1, 1911. On a road or part of a road having yearly passenger earnings of $1,500 a mile, or total earnings of $3,000 a mile, the Commission may shorten the time of introduction by two years. The first draft of this bill, as given in the Annual Report of the Interstate Commerce Commission, was printed in the *Railroad Gazette* of Jan. 1, 1904, page 14.

Atlantic Coast Line.

East of the gulf states the southern railroad business is primarily in the hands of three great companies—the Southern Railway, the Atlantic Coast Line and the Seaboard Air Line, including roughly with the Southern the Central of Georgia. Of these three properties the Atlantic Coast Line, as its name denotes, occupies the coast strip and occupies it very completely, with a joint interest in the Richmond, Fredericksburg & Potomac, which gives it a Wash-

ington connection, and a network of lines reaching Norfolk, Newbern, Wilmington, Charleston, Savannah, Brunswick, Jacksonville, St. Augustine and Tampa. The Southern Railway fills the hinterland of the same great territory of which the coast strip is taken care of by the Atlantic Coast Line, while the Seaboard Air Line competes with both, having neither as good a coast line as the A. C. L. nor as good interior connections as the Southern, although the new Birmingham extension into the heart of a tremendously rich territory, which may be considered quite undeveloped as yet, in view of its possibilities, is a strong asset. Comparisons can be logically made between these three roads, for although many differences in location and environment can be pointed out, they are subject to many similar conditions.

The business of these roads is peculiar, and has important differences from that of the other great systems of the country. The Atlantic Coast Line, through its Louisville & Nashville purchase, has extremely important interior connections which bring it much valuable general traffic. Apart from this, it relies on its freight business in lumber, naval stores, fertilizer, cotton, cattle, fruit and garden produce, the Louisville & Nashville also specifically contributing much grain. These statistics are not shown in the company's

Atlantic Coast Line.

report, but they may be accepted as roughly describing the business done by the road. It will be seen that coal, the universal aid to traffic density for the northern and western roads, does not figure especially prominently. In fact, not so very much coal is carried by the Atlantic Coast Line except that for its own use and for minor local distribution; the Southern Railway differs from it in this respect. The Seaboard Air Line has about the same problem. As a result of this lack of coal, and of its light branch line business, the Atlantic Coast Line hauls its freight in small train loads but gets a high ton rate and makes a showing of net earnings per revenue train mile far better than the interior road. The comparison in this respect may be roughly shown as follows:

	Southern.	A. C. L.
Revenue train load	190 tons.	157 tons.*
Freight earnings per train-mile	$1.771	$2.095
Average ton-mile receipts	.933 cent	1.33 cents.
Net earnings per revenue train-mile†	39.6 cents.	69 cents.

*The Atlantic Coast Line report does not specifically state whether its train-load includes company freight or not.
†All trains.

The item of net earnings per revenue train mile in the above table has to include passenger trains, as there is no really fair way of pro rating operating expenses between passenger and freight. By the method adopted, operating expenses are divided by the entire train mileage, with the result as shown.

The same situation is reflected in the figure showing freight density. The Southern Railway, with an average mileage of 7,164, had in 1904 a freight density of 449,227 tons per mile of road. The Atlantic Coast Line in 1905, with an average mileage worked of 4,307 miles, excluding the Louisville & Nashville, had a freight density of 256,463 ton miles per mile of road. The Seaboard Air Line, with its 2,611 miles, had a freight density of 296,626.

But in spite of density, small train loads and a considerable mileage of pretty thin traffic territory, the Atlantic Coast Line is extremely profitable to its shareholders. The company was formed only a few years ago as a collection of a number of small lines in Virginia and the Carolinas, and its expansion really began in 1901, when the Savannah, Florida & Western and the other Plant properties were absorbed. Early in 1902, as is well remembered, the Louisville & Nashville determined to take advantage of high prices and sell stock before it was listed. This resulted in speculative buying by Gates, and an ugly corner was created, for the reason that the unlisted stock was not a legal delivery, so that more stock had been sold than was in existence, from the standpoint of the stock exchange. Mr. Morgan came to the rescue, and the Atlantic Coast Line, in October, 1902, took control of the property by a majority purchase of the $60,000,000 outstanding capital stock. The Atlantic Coast Line now holds $30,600,000 of Louisville & Nashville stock, for which it paid $35,000,000 in 4 per cent. bonds, $10,000,000 in cash, and $5,000,000 in its own common stock. The cost of the control to the Atlantic Coast Line, therefore, aggregates at the present stock dividend rate, $2,050,000 a year, while it receives from the Louisville & Nashville stock at the present 6 per cent. basis, $1,836,000 a year, although at the time the purchase was made Louisville & Nashville was paying 5 per cent. and bringing in $1,530,000 a year. On the present basis, therefore, it is apparent that the Atlantic Coast Line gets the extremely important benefit of Louisville & Nashville through traffic at a cost of some $214,000 a year, while there is a considerable equity in the stock as well. Besides this great traffic feeder in the south and west, the Atlantic Coast Line also owns one-sixth of the Richmond-Washington line, so that its connections are complete, north, south and west.

Throughout this surprising era of enlargement by absorption of railroad properties, large and small, the Atlantic Coast Line management has financed its property in a very conservative way and has not been led into extravagance. The entire capital stock of the system (excluding, of course, the Louisville & Nashville, from which the tangible balance sheet returns are shown only in income from securities held) amounts to only about $10,612 a mile, and the capital debt is about $30,646 a mile, giving a total capitalization of some $41,258 a mile. The Southern Railway has $25,125 of stock per mile, $21,277 of bonded debt per mile, and a total capitalization per mile of $52,648. The Seaboard Air Line has $23,937 stock per mile, $22,242 funded debt and a total capitalization of about $50,190. As a result of this financial conservatism, the capital stock of the Atlantic Coast Line now sells around 161. In November, 1904, the directors declared an extra dividend of 5 per cent., payable in 4 per cent. certificates of indebtedness of the Atlantic Coast Line Company, in which surplus net earnings had been, in part, invested; also a dividend of 20 per cent., payable in common stock, and authority was given the directors, at their discretion, to declare an additional 20 per cent. dividend out of net earnings. It must be recollected that the Atlantic Coast Line Company is a holding company which owns the stock of the Atlantic Coast Line Railroad Company.

Looking more in detail at the statements of earnings and expenses, it is seen that while the Atlantic Coast Line freight traffic for the year ending June 30, 1905, increased 7¼ per cent., the passenger traffic increased almost 14 per cent. The Florida roads are picking up a large and important winter traffic from New York out of all proportion to that which existed a few years ago, and this is no doubt reflected in this increase. Besides this, the south seems to be well entered into an enduring period of great prosperity which must bring large profits to the railroads that have sufficient reserve in their financing to enable them to keep abreast of the increasing business. Total earnings for the year were $22,222,902, as against $20,544,975 in 1904, operating expenses and taxes aggregated $14,189,768 as against $12,827,094, an increase slightly higher than the increase in earnings. The property seems to have been fully maintained according to the standard of the country and of the traffic, and more than half of the entire increase in operating costs was in the maintenance accounts. The report shows considerable orders of new rolling stock to provide for the new traffic and also the purchase of a large tract of land in Jacksonville for new freight terminals to provide for the opening up of the yellow pine timber territory in Florida. It is evident that all the roads in this territory must face the gradual disappearance of the lumber which is now a very profitable source of income for them, but it

is fair to expect that the general industrial development will supply new traffic at a faster ratio than that at which the old lumber business drops off.

The following table shows the principal statistics of the year's operation:

	1905.	1904.
Average mileage worked.....	4,307	4,192
Freight earnings	$15,383,081	$14,336,934
Passenger earnings	4,893,331	4,295,548
Gross earnings	22,222,902	20,544,975
Maint. way and structures	3,147,650	2,790,234
Maint of equipment	2,225,363	1,846,282
Conducting transportation	7,478,765	6,882,190
Total operating expenses....	14,189,768	12,827,094
Net earnings	8,033,135	7,717,882
Gross income	10,309,884	9,833,036
Net income	4,669,712	4,283,482
Surplus for the year	2,567,627	2,364,647

Union Pacific.

The brilliant history of the Union Pacific since the reorganization in 1897 has often been referred to in the *Railroad Gazette*. In the issue of July 28, on the announcement of the increase of the common stock dividend rate to 5 per cent., the record of the road since the appointment of receivers in 1893 was briefly reviewed in the editorial columns. In the current number the success of the Union Pacific's policy of main line development and its opportunity for extending its influence by branch lines is commented upon. It is a wonderful record of the upbuilding of an antiquated and discredited property into one of the two or three most powerful railroad systems in the country. With all the success which has come in the past, the prosperity of the company has never been as great as that shown in this year's annual statement. It is probably safe to say that no railroad in the country has presented so satisfactory a showing for the late fiscal year. This is the more remarkable because it follows great prosperity in the year preceding, when most of the western roads were feeling the results of poor crops or industrial depression. Coming on top of the exceptional showing of 1904, the 1905 report is a brilliant example of further progress.

The upbuilding of the property has been a twofold development —the physical upbuilding of the railroad and the expansion of its influence and credit. Each of these phases has, of course, had a share in the other, but they may be roughly differentiated to correspond to income and capital accounts.

The report combines results for the Union Pacific, Oregon Short Line, and Oregon Railroad & Navigation Co. Income account shows plainly enough the prosperity of the recent year. Gross earnings of rail lines were $58,756,845, against $54,264,878 in the year previous. This increase of $4,491,967 follows an increase of over $5,000,000 in the previous year. Along with this noteworthy increase in total earnings, operating expenses increased only $1,829,912, against $2,183,950 in 1904, leaving net earnings $28,969,811 in 1905, and $26,307,756 in 1904. Net earnings last year increased $2,662,055, and in 1904, $2,822,915. Including earnings from water lines ($568,103), results for the year are even more favorable. It will at once be observed that the net earnings are a little less than half gross earnings; in other words, that the operating ratio is very low. This, of course, means exceedingly profitable operation. A company that can carry on its business for 51.5 per cent. of its gross earnings, as the Union Pacific did in 1904, and in the next year get the proportion down to 50.7 per cent., is making money on railroad operation faster than it is ever given to most railroads to do. The only important road which has cut down the ratio lower than the Union Pacific is the Great Northern, which last year reduced its proportion from 51.4 per cent. in 1904, about the same as the Union Pacific's figure for that year, to 49.26 per cent., a very exceptional figure. In both cases economy of operation is in the main due to a past and present policy of spending large sums for all sorts of betterments and improvements. How thorough has been this work on the Union Pacific no one who has not known the road from personal acquaintance during the last 10 years can realize. One concrete evidence is the increase in the average car load and train load since the end of the first year under the present organization. In 1898 the average car load was 12½ tons, and train load 278 tons. Last year the average loaded car carried 21 tons, and 507 tons was the lading of the average train. The steady reduction in the operating ratio proves that expenditures for improvements have been larger than sufficient to keep up with the growth of traffic. Money has been spent so liberally and so farsightedly that not only can the great amount of new traffic be handled, but it can also be handled more cheaply.

Per mile, gross earnings were $10,967, an increase of 8 per cent., and net earnings, $5,407, an increase of 10 per cent. Net earnings per mile had in 1904 increased 11 per cent. over 1903. At this rate, with no increase in mileage, net earnings would double in less than 10 years. Gross income was $65,821,708, an increase of about $6,250,000 over 1904. Operating expenses and taxes brought this down to $33,958,993, fixed and contingent charges to $22,785,507, and dividend payments to $11,698,446, the amount of the surplus after dividends. From this sum, $2,479,165 was appropriated for betterments and additions made, $500,000 for betterments and additions to be made on branch lines, and $1,500,000 reserved for the purchase of new equipment—a total appropriation out of income of $4,479,165 for betterments. This left a final profit surplus of $7,200,000, against $4,700,000 in the preceding year. Incidentally, it is worth noting that fixed and contingent charges showed a decrease of $1,278,000 from the 1904 figure, and that on this account and because of increased earnings, the surplus, after charges and before dividends, increased $6,188,000 over 1904. This surplus—$22,785,507—is equivalent to 4 per cent. on the preferred (which was paid), and 11.4 per cent. on the common stock (against 5 per cent. paid). Even this does not represent all the income, for of the deferred payment of $4,260,160 in dividends from the Northern Securities Company, $1,252,988, the proportion which would naturally have been paid in the preceding fiscal year, was kept out of the income account entirely and transferred to profit and loss. Including this, the surplus, after dividends, amounted to something over 12 per cent. on the common stock.

Such a remarkably successful income showing cannot be credited entirely to outside circumstances such as good crops or general prosperity. It must reflect as well economical and farsighted management.

The statement of operating expenses makes this very clear. The increase of $1,829,912 in the total is due almost entirely to larger maintenance expenses. The cost of getting and moving the traffic shows an actual decrease. Maintenance of way and of equipment each increased over 12 per cent. from the liberal estimates of the preceding year. Maintenance of way was $1,290 per mile of main and second track, against $1,192 in 1904, and $941 in 1903. The splendid condition in which the roadway was kept during those earlier two years is well known. It is not hard to get an idea of the liberal expenditures on the line in the fiscal year, 1905. In maintenance of equipment the same reasoning holds good. Repairs and renewals of locomotives cost $3,791 per locomotive, against $3,565 in 1904; of passenger cars, $1,272 per car, against $813 in 1904, and of freight cars, $103 per freight car, against $75 in 1904. One does not need to be told that the item of repairs and renewals includes a large charge for account of equipment sold, destroyed or condemned, or that the Union Pacific's equipment is being maintained in a high order of efficiency.

Conducting transportation presents a remarkable showing. There were 42,300,000 more passengers carried one mile than in the previous year, and 768,800,000 more tons of revenue freight, yet that operating expense, which is supposed to respond most quickly and vary most directly with changes in traffic, shows a slight decrease for the year. Here is where the economy of recent liberal expenditures for improvements is apparent. The foresight of those who inaugurated the improvement policy is shown most of all in the loading of trains. First of all, 1,980 lbs. more was put into each loaded car than in the previous year; second, there were two more loaded cars or 56 more tons in each train (the train load was 451 tons in 1904 and 507 tons in 1905); third, the average cost per mile run by locomotives for wages, fuel, water, and all other supplies, was considerably reduced. Thus although the locomotives hauled more and there was an increase in locomotive mileage, there was a decrease of $182,500 in the cost of locomotive service. There was a similar decrease of $22,000 in the cost of train service. An increase of $103,139 in payments for injuries, loss and damage, was the largest increase under conducting transportation. It is in this account that many another railroad has most to learn from the Union Pacific. To be able to get and move the traffic for only 23.7 per cent. of gross earnings is an ideal which, if it could be realized, would turn a railroad like the Rock Island from a gigantic experiment into a solidly prosperous property.

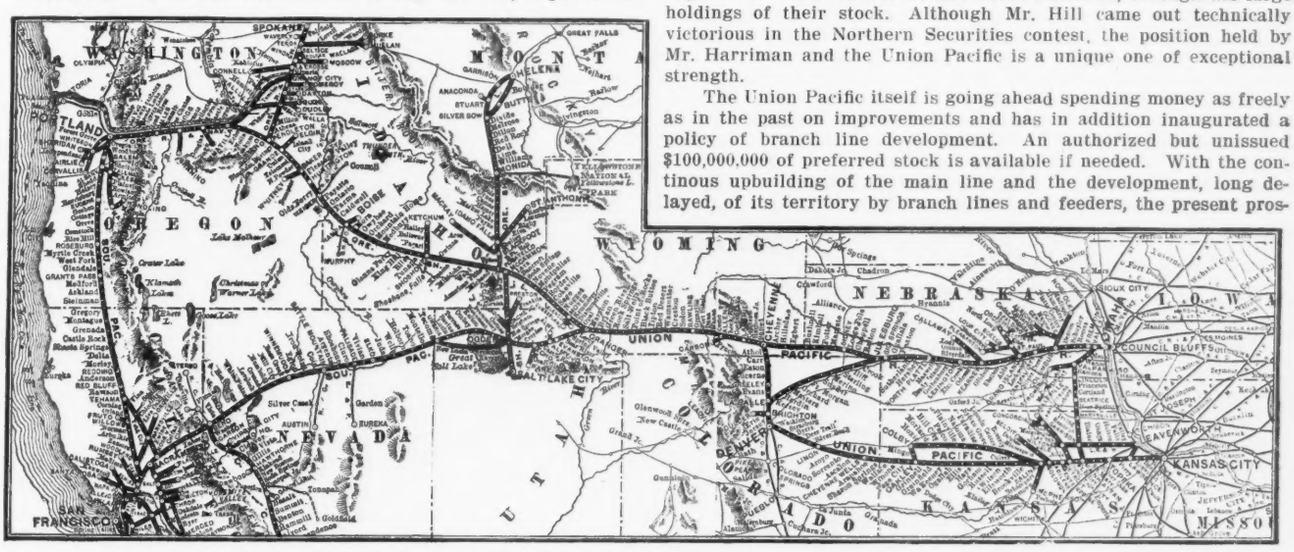
Following the general rule of the Harriman lines, no statement of kinds of traffic carried is included in the report. With this exception, however, the document is an admirable presentation of the condition of the railroad. The traffic statistics which are given, show that there were 4,128,435 passengers carried—98,794 per mile of road. The average passenger traveled 128 miles against 126 miles in 1904. The average passenger, of whom the average train carried 60, enriched the company by $2.75, another sign of the long distance travel over the road. Per passenger mile the company received 2.14 cents.

The freight carried totaled 14,740,130 tons (including 3,535,000 tons of company freight), or 1,062,300 tons one mile per mile of road. This is an increase of 18 per cent. in freight density. Freight is three times as much of a long distance commodity as passengers, for the average ton was carried 386 miles in 1905, an increase of 33 miles over 1904. The average amount received from each ton of freight was $3.83, and the average receipts per ton mile, 8.9 mills.

Capital account shows the financial strength and the widespread extent of the Union Pacific system. The item, "Cost of railroads, equipment and appurtenances," has decreased $1,700,000 since 1904—this at the same time with the extensive improvements which have been under way, at a charge of $2,479,000 to capital account. The decrease in the item comes about by deducting appropriations from

income of $2,479,000 (canceling the capital charge), $1,685,000 received from the sale of lands applied under the provisions of the railroad and land grant mortgage to improvements, and two small adjustments, making a total deduction of $4,188,753. Under this unusually conservative method of bookkeeping, $5,780,982 was in 1904 similarly deducted from the company's assets.

Stocks and bonds owned are carried in the balance sheet at $159,275,326. This represents their cost and takes no account of later advances in value. Allowing for the present market value of the securities, the value of these investments probably amounts to something like $225,000,000. The securities owned on June 30, 1905, included $90,000,000 common stock and $18,000,000 preferred stock of the Southern Pacific, $18,665,259 stock of the Great Northern, $24,295,152 stock of the Northern Pacific and $12,850,000 stock of the Northern Securities Company. Assuming that this Northern Securities stock has since been converted, the Union Pacific should now hold $22,503,336 Great Northern and $29,290,885 Northern Pacific stock. Another large holding, for the first time made public, is $10,340,100 preferred stock of the Chicago & Alton, acquired during the year and held under an agreement announced to secure important and substantial advantages to the Union Pacific. During the year, the $18,000,000 preferred stock of the Southern Pacific was also subscribed for. These two items principally account for an increase of nearly $20,000,000 in the cost price of stock and bonds owned. During the year there was also advanced to the San Pedro, Los Angeles & Salt Lake Railroad $5,440,000, making the total investment in that road to date, $20,400,000. Payments of $1,739,688 were made for the construction of new lines, and there were $3,725,500 face value more old bonds retired than new bonds issued, making a total capital disbursement on these accounts of $10,905,188. Funds for the large stock purchases of the year and these capital payments were principally obtained from the repayment of loans to other companies and from the sale in the open market of $7,150,100 stock of the Northern Securities Company. Counting in securities of the auxiliary companies (O. S. L. and O. R. R. & N.), the par value of stock owned on June 30th was $258,000,000 and of bonds $98,724,500, a total holding of over $356,000,000 in securities.



Union Pacific, Oregon Short Line and Oregon Railroad & Navigation Company.

The Southern Pacific lines west of Ogden and south of Portland are not treated of in the report.

In the 12 months of the fiscal year $56,071,000 of convertible 4 per cent. bonds were converted into an equal amount of common stock. The bonded debt was further reduced by the payment of $10,000,000 Union Pacific 5 per cent. collateral notes, which fell due on February 1st. The bond conversion and the increase of one of the two dividend payments from 2 to 2½ per cent., increased the dividend requirements for the year by $2,754,515. A side light on the company's financial strength is the profit and loss balance for the year, which was $34,943,194, an increase of $8,937,512 over the 1904 figure.

As an operating railroad, the Union Pacific has, by large expenditures for betterments in all departments, brought about a very high standard of economy and efficiency. It has become a principal transcontinental highway. As a holding company for the securities of other railroads, the Union Pacific has had almost equal success. Taking no account of the Chicago & Alton, or the San Pedro, Los Angeles & Salt Lake, the Harriman system comprises some 15,000 miles of line. As yet the Union Pacific's investment in $90,000,000 common stock of the Southern Pacific pays no direct dividends; but, indirectly, control of the Southern Pacific lines constitutes a very great strategic advantage, and the time cannot be far distant when, with the large expenditures which have for years been made out of earnings on that company's property, it will be in shape to make a return on its common shares. As part owner in the Northern Securities Company, even though a loser in the contest for control of the Northern Pacific, the Union Pacific, through its large holdings of Great Northern and Northern Pacific stock, exchanged for Northern Securities, gets a large share of all the prosperity of those two very prosperous northwestern railroads. Thus the statement that his two bitterest competitors are working for Mr. Harriman has justification. In fact, all railroads west of Chicago contribute to the prosperity of his investments. The greater the traffic of the granger lines, the greater will be the prosperity of the Union Pacific itself. Even supposing their transcontinental traffic goes by some other road (unless possibly by the Canadian Pacific) he gets a share of the receipts. The Southern Pacific is his property. His investment in the Santa Fe is in all probability by no means a small one. He has a half interest in the San Pedro, Los Angeles & Salt Lake and a large share in the earnings of the Northern Pacific and Great Northern, through his large holdings of their stock. Although Mr. Hill came out technically victorious in the Northern Securities contest, the position held by Mr. Harriman and the Union Pacific is a unique one of exceptional strength.

The Union Pacific itself is going ahead spending money as freely as in the past on improvements and has in addition inaugurated a policy of branch line development. An authorized but unissued $100,000,000 of preferred stock is available if needed. With the continous upbuilding of the main line and the development, long delayed, of its territory by branch lines and feeders, the present prosperity of the Union Pacific and even greater prosperity for the future seem assured.

The principal statistics of operation follow:

	1905.	1904.
Average mileage	5,358	5,353
Freight earnings	$42,962,258	$39,452,068
Passenger earnings	11,343,339	10,508,897
Gross earnings	58,756,845	54,264,878
Maint. way and structures	7,341,905	6,497,270
Maint. of equipment	6,883,676	6,111,552
Conducting transportation	13,927,128	13,975,075
General expenses	1,634,326	1,373,224
Total expenses	29,787,034	27,957,122
Net earnings from operation	28,969,811	26,307,756
Gross income	65,821,708	59,546,074
Net income	22,785,507	16,597,092

NEW PUBLICATIONS.

Instruction Papers of the American School of Correspondence at Armour Institute of Technology, Chicago. Size, 6⅞x9¾ in.

Copies of new instruction papers on several different engineering subjects have been sent us by the American School of Correspondence at Armour Institute, Chicago. Two papers on "Railroad Engineering," just from the press and forming only a part of this subject, are by Walter Loring Webb, the well-known engineer, who prepared the papers especially for the students of this school. They form Parts I and II of the subject and deal with surveys, construction, railroad structures and track work. In the 200 pages which they comprise, it is, of course, not possible to do more than treat briefly the fundamentals of the various subjects and their sub-divisions. In doing this, however, the papers serve acceptably the purpose for which they are designed, which is to meet the needs of the practical man of limited education. A 65-page paper by Mr. Webb on "Plotting and Topography" instructs simply and clearly in the definitions, in the methods employed in the field and in the proper execution of the office work. Five plates are included, two of which show conventional signs and the remaining three reproduce work of the U. S. Coast and Geodetic Survey primarily to illustrate the application of these conventional signs, one of the plates being in colors. The papers also include Mr. Webb's "Trigonometric Tables," which are reprinted from his work on "Railroad Construction."

A paper on "Masonry Construction" is prepared by Austin T.

Byrne. Two parts have been printed. These are also elementary in their scope, the two parts comprising 117 pages. A student having no previous acquaintance with the subject can obtain from these papers a brief general knowledge of the more important features, and of present practice; although some things have been omitted that should have been included, as, for instance, under sheet piling no mention is made of the steel variety, reference being confined to wooden sheet piling only. Reinforced concrete construction, or concrete-steel masonry as the author calls it, is given only two pages at the end of Part II, and is confined almost entirely to the briefest possible mention of several systems of arch construction. A paragraph is given to the method of building reinforced concrete walls.

"Water Supply," in two parts, was written by Prof. Frederick E. Turneaure, C.E., of the University of Wisconsin. This subject being less broad than the other two, is dealt with more in detail. Like the others, it omits all but the simplest mathematics, such formulæ as are necessary being given in most cases without reference to their derivation. Prof. Turneaure presents the subject entertainingly and it should hold the interest of the student from the outset. A paper on "Hydraulics" by the same author is an elementary treatise of 55 pages on the subject. A more advanced knowledge of mathematics is required for its study than for the other papers, the student needing to understand trigonometry.

The papers are illustrated with half-tones and well-executed line engravings, and their typographical excellence should be noted, although several typographical errors were observed. A list of examination questions is given at the end of each part of each paper.

TRADE CATALOGUES.

"From Pike's Peak to Morro Castle."—This is the title of a prospectus prepared by the United States Construction Company, incorporated under the laws of Oklahoma, principal office in Kansas City, Mo. The company was chartered to build a line of railroad between Colorado and New Orleans, which it proposes to do in three separate sections under different names, as follows: The Guthrie, Fairview & Western, chartered to build northwesterly from Guthrie, Okla. T., via Kingfisher, to a connection with the K. C., M. & O.; the Guthrie, Shawnee & Shreveport, and the Colorado, Oklahoma & New Orleans, chartered to build from Denver, via Trinidad, to connection with the Guthrie, Fairview & Western. The prospectus sets forth in considerable detail the advantages of such a line, estimated cost of construction, traffic possibilities and possible earnings, etc., and offers for sale a major part of the capital stock at par. The prospectus states that construction work has already begun.

Brake Beams.—An attractive catalogue is being distributed by the Buffalo Brake Beam Co., New York. In it is described and illustrated the various sizes and designs of brake beams made by the above company, including special brake beams for passenger and freight equipment, and special brake beams for use where space is limited. A full size section of the Buffalo brake beam is shown, and a table with diagrams of different shaped sections shows the comparative strength and percentage of increase in strength of the Buffalo section over other sections. Illustrations of the Buffalo one-piece and two-piece forged fulcrums are also shown.

Track Drills.—The Buda Foundry & Mfg. Co., Chicago, sends a new catalogue illustrating the new features of its track drills and giving a complete price list of Paulus, Buda, Harvey, Wilson and Rich drills, which it makes. The catalogue also gives views and complete lists of repair parts and drill bits. The final pages are devoted to the Paige Iron Works department, making switches, frogs, crossings, derails, etc.

CONTRIBUTIONS

Telephones When Wrecked in the Wilderness.

New York, Dec. 6, 1905.

To the Editor of the Railroad Gazette:

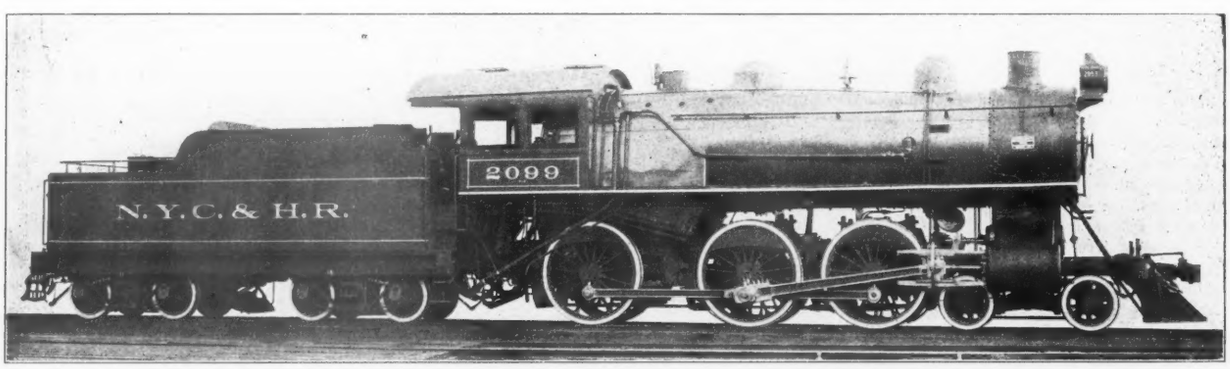
In the *New York Herald* of Saturday last it is stated that Brakeman Headman, of the Central Railroad of New Jersey, who was caught in the wreck of his passenger train, which fell down a bank and lodged in the river, near Penn Haven on Friday night, and had his arm broken and suffered other injuries, performed the heroic service of securing help by immediately walking four miles to Penn Haven Junction. As soon as he gathered himself together, says the report, and knowing that no help could be had from another train on the bleak mountainside for three hours, he started back for Penn Haven junction, where, on the opposite side of the river, he knew was the only telegraph office for miles around. He made his way, in spite of the bitter cold, to the place, and wired to Mauch Chunk for relief trains and physicians.

I call this incident to your attention merely to say that a telephone on the train, with provision for telephoning over the telegraph wires of the railroad, would have made this painful four-mile walk unnecessary; and besides would have enabled the relief to reach the injured passengers an hour sooner. You have printed various reports about the use of telephones on wrecking trains, and on passenger trains and cabooses, as well as the placing of 'phones in boxes on posts along the track; but the use of this valuable aid to railroading seems to spread very slowly. Why does it not find favor on every railroad? To let a score or a half score passengers and trainmen—or a single one—suffer cold and pain while the messenger for relief goes a long distance on foot, and on a road traversed by a dozen electric wires—is a thing which should be very much out of date in the year 1905.

T. G. F.

Ten-Wheeled (4-6-0) Locomotive for the New York Central & Hudson River.

Fifteen locomotives of the 4-6-0 type have recently been built by the American Locomotive Co. for the New York Central, intended for both fast freight and heavy passenger service. In a way this is a reversion to the old practice of the road 25 years ago, when one type of engine was used in front of everything. The resemblance ends there, however, for nothing like these new engines was in existence at that time. Cylinders 22 in. in diameter with a piston stroke of 26 in. and a weight on drivers of 148,000 lbs., are features that did not belong to locomotives of the old regime. The illustration from a photograph and the side elevation show the size and power of the machine. Though the top of the stack is nearly 14 ft. 7½ in. above the rail it is but 23 in. above the smoke-box, while the top of the boiler barrel is 13 ft. 1¾ in. above the rail. This necessitates the use of a very low dome, though the height of the steam intake above the water line is helped by the wagon-top. The firebox is 106 in. long inside, with a sloping grate. It is fitted with water tubes for carrying a brick arch. The throat sheet has the forward slope with the widening leg that is current practice and by which the water has free access to the lower end of the arch tubes.



Heavy Ten-Wheel (4-6-0) Type Locomotive for Freight and Passenger Service—New York Central & Hudson River.

In cross-section the side water-legs of the firebox show but a slight increase in width from the bottom to the top. They are only 3½ in. at the bottom and 4 in. at the top, with sheets that are nearly vertical. The reason for this was probably a desire to widen the nest of tubes as much as possible and so increase their number, which is 400, to give a heating surface of more than 3,100 sq. ft.

Owing to the height of the top of the boiler above the rails, the whistle and safety valves are set directly on the sheet of the

wagon-top, which is reinforced underneath with a ⅝-in. liner. The boiler extends back for about one-half the length of the cab, so that the latter is roomy and convenient.

The frame has a width of 5 in. with a depth of 6 in. at the pedestals and 5 in. between the two front pairs of drivers and 5½ in. between the second and third pairs, where the firebox rests. The latter is carried by an expansion block at the front and the usual buckle plates at the back, while three supports of the same character are placed beneath the shell. The pedestal braces are unusually heavy; and, besides being fitted over ample lugs, are held in place by three 1¼-in. bolts.

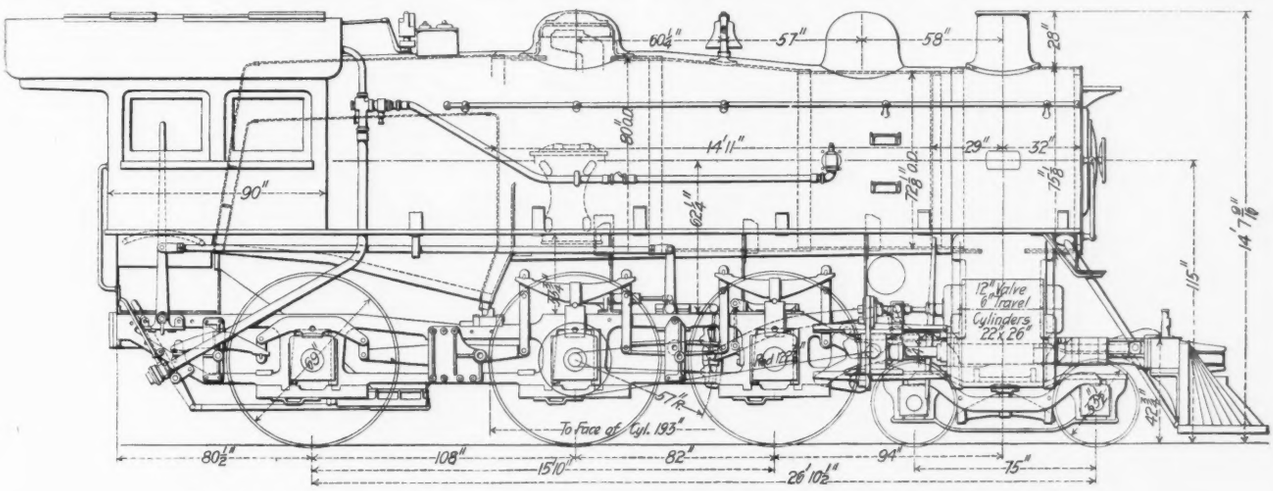
An interesting feature is the valve motion. The link is located just back of the forward driving axle, while the rocker, instead of being in line with it, is set ahead to a point only 43½ in. back of the cylinder center. The motion is carried forward from the

are all-around machines, available for both passenger and freight work and adapted for almost any emergency condition. The fact that the New York Central has selected the 4-6-0 type in this case is interesting as demonstrating its wide range of serviceability, especially in view of the fact that the road has a number of the 4-6-2 type engines which have given excellent results.

The following table presents some comparisons between the 4-6-2 and the 4-6-0 types of this road:

	4-6-2.	4-6-0.	Increase, pr ct. 4-6-2.	4-6-0.
Weight, total engine	222,000 lbs.	194,500 lbs.	14.2	...
Weight, total, eng. & tender	355,000 "	338,400 "	5.0	...
Tractive power	28,500 "	31,000 "	....	8.8
Grate area	50.2 sq. ft.	54.93 sq. ft.	....	9.4
Total heating surface	3,633 sq. ft.	3,306 sq. ft.	9.9	...

While the 4-6-0 locomotive has 27,500 lbs. less weight than the 4-6-2 type, the tractive power is 8.8 per cent. greater, and the grate



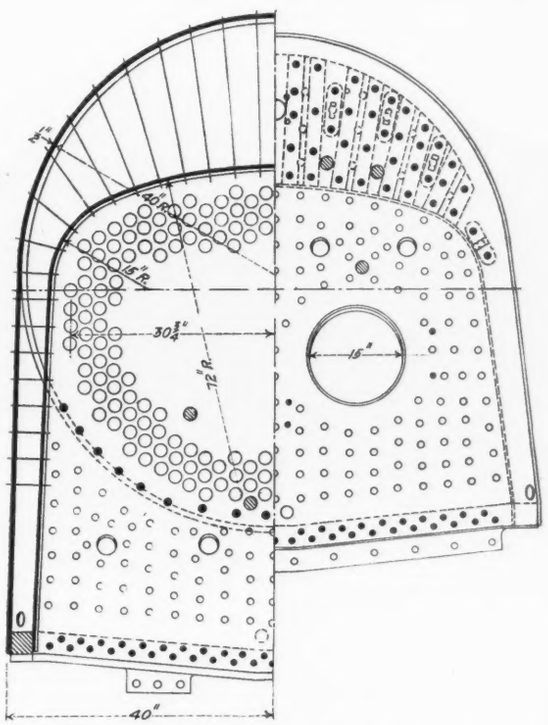
Side Elevation of Ten-Wheel (4-6-0) Type Locomotive for the New York Central & Hudson River.

area 9 per cent. greater, but the heating surface is less. The smaller heating surface will probably affect the staying qualities, and the 4-6-2 class should have a larger reserve capacity for long runs without stops and for heavy trains at high speeds, but for all trains in which high speed long sustained is not required, the 4-6-0 type should be eminently satisfactory.

This design, which was worked out under the direction of Mr. J. F. Deems, General Superintendent of Motive Power of the New York Central, may be taken to indicate that the possibilities of the 4-6-0 and the 4-6-2 types have not yet been exhausted.

The principal dimensions of these engines are as follows:

Cylinder, diameter	22 in.
Piston, stroke	26 in.
Tractive power	31,000 lbs.
Wheel base, driving	15 ft. 10 in.
" " total	26 " 10⅛ "
" " engine and tender	59 " 2 "
Weight in working order	194,500 lbs.
" on drivers	148,000 "
" engine and tender	338,400 "
Heating surface, tubes	3,104.5 sq. ft.
" " firebox	174.6 "
" " arch tubes	26.4 "
" " total	3,305.5 "
Grate area	54.93 "
Axles, driving journals, diameter	9½ in.
" driving journals, length	12 "
" truck " diameter	6¼ "
" truck " length	10 "
" tender " diameter	5½ "
" tender " length	10 "
Boiler, outside diameter of first ring	72⅛ "
" working pressure	200 lbs.
" fuel	Bituminous coal
Firebox, type....Wide; length....105¼ in.; width....75¼ in.	
" thickness, crown and side sheets	⅜ "
" thickness tube sheet	½ "
" width front water leg	4 "
" width side and back water leg	3½ "
" type of crown staying	Radial
Tubes, length	14 ft. 11 in.
" diameter	2 "
" number	400
" material	Charcoal iron
Piston rod, diameter	4 in.
Piston packing	Cast-iron rings
Smokestack above rail	14 ft. 7 7-16 in.
Smokestack, diameter	20 "
Tank, capacity, water	7,000 gals.
Tank, capacity, fuel	12 tons
Valves, type	Piston
" travel	6 in.
" diameter	12 "
" steam lap	1 "
" exhaust clearance	¼ "
" lead	0 "
Wheels, driver, diameter	69 "
" truck diameter	33 "
" tender, diameter	36 "



Cross-Section Through Boiler and Firebox.

one to the other by a connection bar, suspended on a swinging link at the back and attached to the inner rocker arm at the front. This makes a very short and compact valve stem with its connections, but requires considerable stiffness in the rod itself to avoid buckling.

The guide yoke is set well forward on the guides and serves, with the buckle plates already mentioned, to give the requisite stiffness to the frames. The engines have been termed "combination" locomotives by the railroad in the sense that they

The engines are equipped with the New York automatic and straight air for both driver and tender wheels with the New York

air signal. Compressed air is supplied by a No. 5 duplex pump delivering into one main reservoir 20½ in. in diameter and 130 in. long.

Single exhaust nozzles are used and these have been applied of 5⅜, 5⅝ and 5⅞ in. in diameter. The tender frame is formed of 13-in. channels and plates, and the tank is made with a water bottom and gravity slides so as to deliver the coal as far as practicable at the gates.

Centenary of the Lancashire Railroads.

BY W. B. PALEY.

There are probably not many political divisions in Great Britain or elsewhere which contain a greater mileage of railroads in proportion to their area than Lancashire does. The origin of the vast network which now covers the country had its rise just one hundred years ago. As in several other cases, this came about through the instrumentality of canals. One of the most important of the many canals projected about 1792, the period when a distinct "canal mania" took possession of the moneyed class in Great Britain, was intended to connect the Leeds & Liverpool Canal, near Wigan, in Lancashire, with the town of Kendal, in the adjoining county of Westmoreland. This was to be termed the Lancaster Canal. The company obtained its Act of Parliament on June 11, 1792, the line being about 76 miles long, and passing through Preston and Lancaster in its roundabout course. It was soon found, however, that to carry it across the wide valley of the Ribble, just south of Preston, would be extremely costly, in consequence of which it was determined to insert a short length of railroad or tram road to connect the canals on either side.

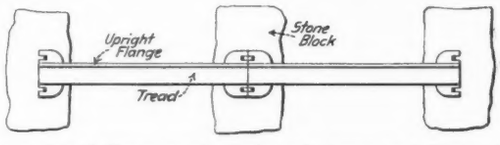
The southern portion of the canal, now entirely disused, terminates at Walton summit, or Thorpe Green, a desolate and lonely place between Preston and Chorley. Here is a basin with two arms, between them being a short dock, which evidently had a stone-built shed over it at one time. Five or six boats lie rotting and full of water, and the whole place is a melancholy example of skill and energy now utterly useless. From each side a line of railroad, still quite traceable, ran down the hill-side till the two met on level ground in less than half a mile. There were evidently interlacing or cross-tracks close to the top, whereby either wharf could send or receive cars, and between them must have been winding machinery, as the gradient is too steep for horses. Possibly this was of the self-acting kind, but no remains of it exist. Further down, between the two lines, is what looks at first sight like a bit of canal, but is really an excavation where the material forming the inclines was obtained. Another peculiarity which strikes an observant visitor is that the stone blocks of the western arm are unusually close together, yet the plug-holes for holding down the cast-iron ⌋|_ plates are not in line with each other. On examination it will be found that there are no blocks at all on the other line, and that they have been taken up and inserted between those of the western branch, thus practically converting it into a stone tramway and enabling the farmer to get his hay carts up and down the boggy slope. From the point where the two single lines come alongside each other, near a small farm, the course of the old tram road lies in a grassy lane about 16 to 18 ft. wide, till it reaches the village of Bamber Bridge, a mile further. Two by-roads are crossed on the way, at each of which are formidable barriers of wood to prevent trespassing. At the main street of Bamber Bridge, which the line crossed somewhat on the skew, is a notice:

ANY PERSON FOUND TRESSPASSING
Upon This Site of Tramway
the Property of
The London & North Western
and
Lancashire & Yorkshire
Railway Companies,
or Damaging the Fences Thereto
Will Be Prosecuted According to Law.
By Order.

On the other side of the street, however, the line goes on as a public footpath, forming an important short cut for nearly half a mile. It is then lost for a short distance, but is found again as a barred-up lane further on. Except that the cast-iron plates, 3 ft. long, have all disappeared, nothing has been altered. The blocks which carried them are of hard sandstone, not square, as usual, but 2 ft. by 1 ft., placed transversely. Each has two plug-holes 4 in. apart at the centres and ¾ in. in diameter. In some cases the spike and wooden plug or treenail remain. The holes are about 5 in. deep, equal to half the thickness of the block. From the marks left the plates evidently widened out to 8 in. at the ends, to secure a steady base. Another object was to provide places for the spikes clear of the wheels, the holes being half-notches in the outer ends of the base. These corresponded with the notches of the next plate, both having sloping sides, a spike with shoulders to fit them held down two plates at once. The improvement of two spikes clear of the tread, instead of only one, and that in the middle of it, was due to Benjamin Outram, whose firm, Outram & Jessop, of Butterley Ironworks, Derbyshire, laid the tram road. The tread of the plates would have been only 3 in. wide, on which wheels about 1 in. thick were used. The gage from centre to centre of the treads was 5 ft.

Some portion of the line, in this second enclosed section, was neatly paved with small stones, probably where the ground was wet. The section in question extends about ¾ mile, in which are 3 or 4 most unpleasant obstacles of barbed wire fixed to stout fencing adorned with hook-headed nails. At last these end at a road running north and south, after which the rest of the way into Preston is a public footpath, perfectly open and free to all men. The lane continues, with the blocks showing on the surface, in a very level course till it nears the Lancashire & Yorkshire Railway, where a perceptible fall occurs at the edge of the Ribble valley. It is doubtful whether mechanical power, or extra horses, were used here. The line now runs out upon an embankment, about 12 or 15 ft. high and 20 ft. wide, for another three-quarter mile, till the river Ribble is reached. The edges of the embankment have been planted with lime trees by the Corporation of Preston, to whom it belongs, the result being a beautiful shady avenue. There are no bridges over roads, but in two places footpaths run to the bottom, passengers climb up to the top, cross and go down again. The Ribble is crossed by a modern bridge of wood, succeeding the original one of the same material. Directly the river is passed an extremely steep, though short, incline, of about 1 in 6, is faced. This is now a footpath in the public gardens, but at the top, where a stone pavilion stands, used to be a stationary engine, which worked the wagons up and down by means of a continuous chain. In the Free Library at Preston two illustrations are preserved, showing the bridge, engine house and the wheel or dam round which the chain passed at the bottom of the incline.

The remainder of the tram road site, the short distance from the top of the incline to the basin forming the south end of the northern section of the canal, is now built over, but it passed under Fishergate, the main street of Preston, by means of a short tunnel.



Lancaster Canal Tram-road—Putnam's Improved Plate, 1803.

In 1831 a serious accident occurred by the chain breaking, the wagons dashing down instantly and killing a man who was riding with them.

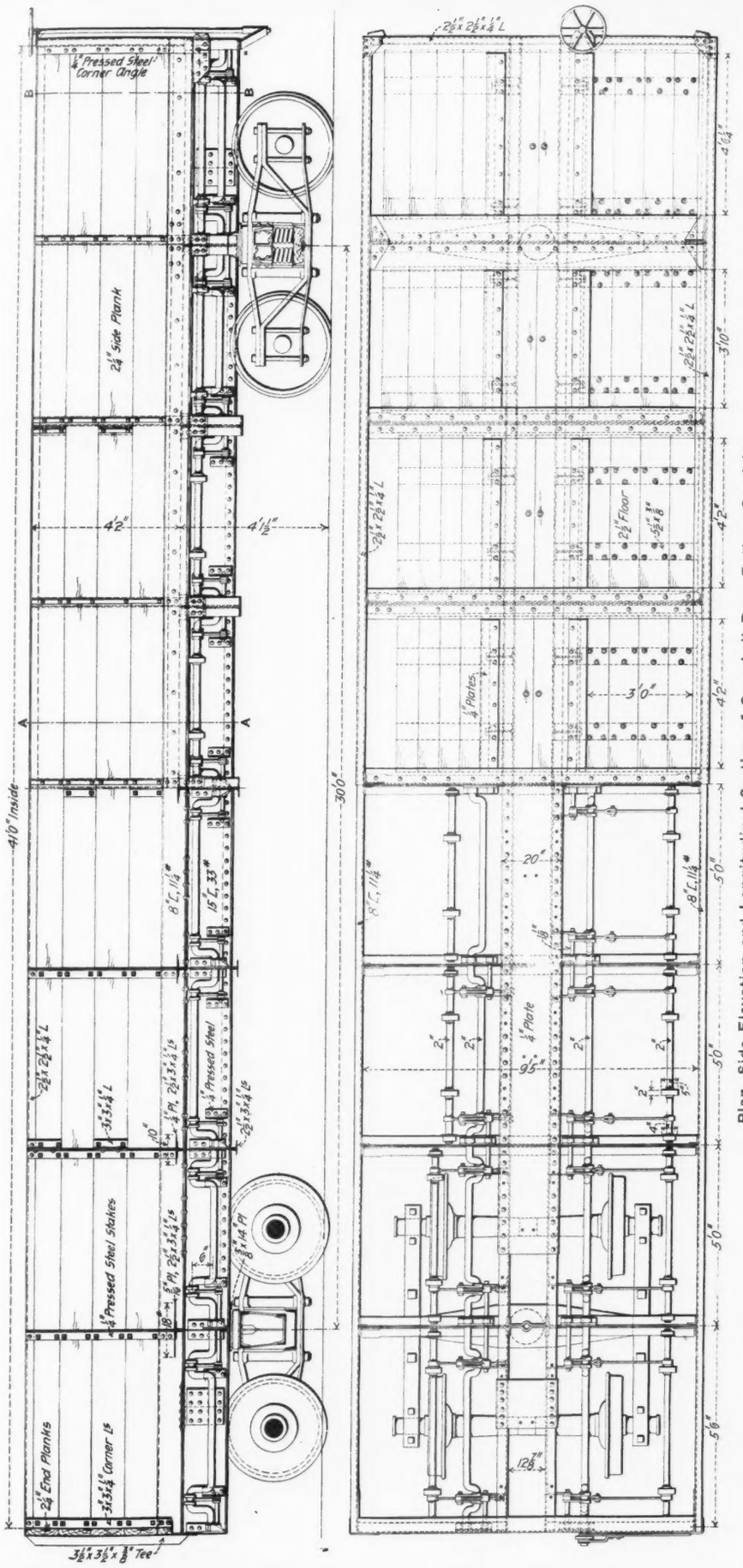
The portion of the railroad extending from Walton Summit to Bamber Bridge was opened for traffic on June 1, 1803, when a procession of 27 wagons carrying each about one ton of coal, was taken down by one horse; no very wonderful feat. The remainder of the line was completed in 1805, so that the centenary of Lancashire railroads may be said to have occurred this year. The canal was severely injured, as a commercial undertaking, by the interruption to through traffic caused by the severance of its northern and southern portions. It paid a fair dividend at one time, nevertheless, but the introduction of steam railways ruined it all the more quickly because of the break. In 1837 the tramway was acquired by the Bolton & Preston Railway Company, which did nothing with it, and in 1844 passed, with its belongings, into the hands of the North Union Railway, who worked it till 1859. After 9 years of disuse the plates and the winding machinery were taken up, and the embankment sold to the Preston Corporation. The North Union Company, extinct since 1888, long ago became absorbed jointly by the London & North Western and Lancashire & Yorkshire Railways, the former of which now owns and works the northern part of the canal, from Preston to Kendal.

The total length of the old tram road, basin to basin, was about 4¾ miles, the rise from the lowest point of the embankment to the disused wharf at Walton Summit is said to be 222 ft., equal to an average gradient of 1 in 77, but most of this is concentrated at the two points mentioned.

The Campbell Drop-Bottom Gondola Car.

A new design of drop-bottom gondola car, devised by Mr. Argyle Campbell, Chicago, is illustrated herewith. Its capacity is 100,000 lbs., the inside dimensions being 41 ft. long by 9 ft. 5 in. wide by 4 ft. 2 in. height of side. There are eight doors on each side, or 16 in all, operated in sets of four, which it is claimed will discharge 95 per cent. of the load.

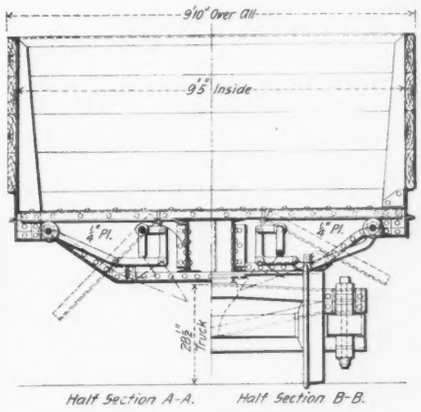
The center sills are 15-in. channels with a ¼-in. top cover plate and 3½-in. x 3½-in. x ⅜-in. bottom reinforcing angles. The side sills are 8-in. channels, and the transverse framing is composed of five continuous diaphragms between bolsters. These diaphragms are made of ¼-in. plate with 2½-in. x 3-in. x ¼-in. angles



Plan, Side Elevation and Longitudinal Section of Campbell Drop Bottom Gondola.

top and bottom, and are secured to the center sills by angles. On the top of each diaphragm, riveted to the angles, is a ¼-in. x 10-in. plate extending the width of the car, while 5/16-in. x 18-in. plates are used over the body bolsters. The end sills are made from ¼-in. plates flanged at top and bottom, with a reinforcing casting around the coupler.

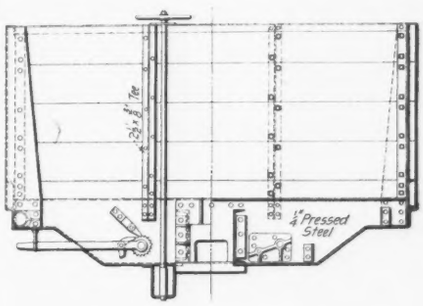
The side stakes are placed inside. They are made of ¼-in. steel, bent to angle section, and increase from a top width of 2½ in. to a bottom width of 7 in. where they are riveted to the diaphragms. The



Half Cross-Sections.

top plate of the body bolsters is secured to the side stakes by special bent plates, as shown by the drawings. The end stakes are 3½-in. x 3½-in. x ⅜-in. T-beams for greater strength, which are riveted to the end sills. Running around the tops of the side and end boards and forming a protection therefor is a 2½-in. x 2½-in. x ¼-in. angle, which is riveted to the side and end stakes. At the corners an additional angle is used on the inside, with the usual outside corner band.

Each set of four doors is operated by a 2-in. longtitudinal shaft, bent at several points, as shown by the drawings, to form



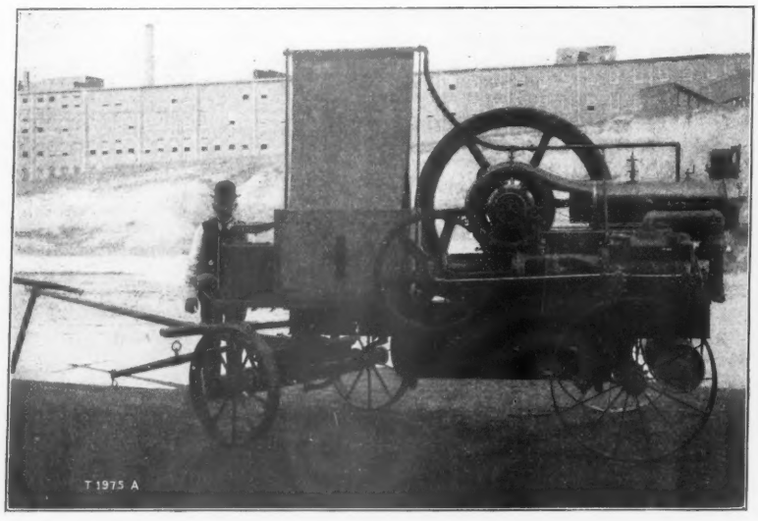
Half Outside End Elevation. Half Inside Elevation.

Half End Elevations.

cranks and also to clear the bell-cranks, the upper ends of which are joined to the shaft by short pieces about 6 in. long, rigidly secured to the shaft. The lower end of the bell-crank is connected to a push arm, the opposite end of which is joined to a short shaft near the outer edge of the door. This shaft has a small wheel on each end which runs on the bottom angle of the adjacent diaphragm, and also two small wheels at intermediate points on which the door bears. Adjacent bell-cranks on opposite sides of a diaphragm are mounted on a short shaft extending

through the diaphragm and having its bearing in a small malleable casting secured to the diaphragm and also furnishing the bearing for the main shaft. The outer ends of the bell-crank shaft are steadied by short pieces riveted to the adjacent center sill.

Each set of doors is operated by a ratchet lever at the end of the car. The ratchet wheel has a compound pawl and an additional pawl above. When it is desired to open the doors the top pawl is thrown up out of position. The top portion of the compound pawl being heavier than the bottom, throws the latter into service, and a slight pressure downward on the ratchet lever starts the doors, which drop open. The cranked portion of the shaft rotates to the left through about 200 deg., its position and those of the bell-crank and connected parts being indicated by the broken lines in the cross-sectional views. To close the doors the top pawl and the upper part of the compound pawl are dropped into position, throwing the lower pawl out of service. The doors can then be closed with comparatively little effort. It will be noted that the relation of the cranks and levers is such that the push on the doors is always approximately normal thereto. This, with the extra leverage secured by the bell-crank, makes the doors close easily. All of the doors open to 45 deg. except over the trucks, where the opening is about 30 deg. The design is controlled by the Enterprise Railway Equipment Company, Chicago.



Portable Air Compressor for Panama.

Researches on the Purdue Locomotive.

Porf. Goss has ready for publication the manuscript of a book which is a compilation of the results of the researches conducted by the engineering laboratory of Purdue University relative to locomotive performance. Much of the contained matter has already been published in the form of papers read before engineering societies and railroad clubs or contributed to the technical press. In his book Prof. Goss has correlated this matter in its proper sequence under the various principal headings into which it should be subdivided. The table of contents is given below, from which it will be seen that in collecting these data into book form Prof. Goss has prepared a volume which will be a valuable reference work on this important subject.

1. *Locomotive Testing.*
I.—The Development of the Purdue Testing Plant.
II.—Growth of Interest in Locomotive Testing.
III.—The Laboratory Locomotives, Schenectady No. 1.
IV.—Methods of Testing and Exhibit of Data.

2. *Locomotive Performance, a Typical Exhibit.*
V.—Locomotive Performance at Different Speeds and Cut-offs.

3. *The Boiler.*
VI.—Boiler Performance.
VII.—High Rates of Combustion.
VIII.—Thick Firing.
IX.—Spark Losses.
X.—Radiation Losses.
XI.—The Front End.
XII.—Superheating in the Smokebox.

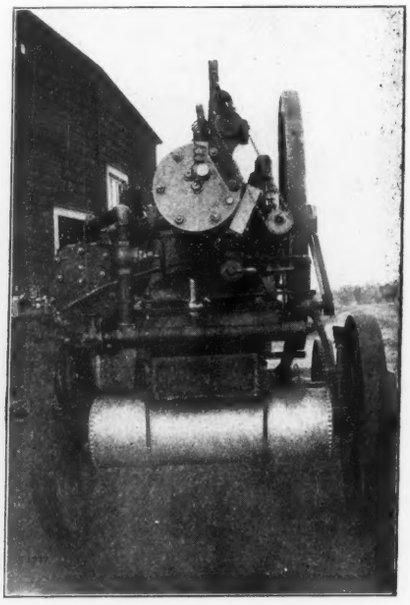
4. *The Engines.*
XIII.—Lead and Its Effect upon Performance.
XIV.—Outside Lap.
XV.—Inside Clearance.
XVI.—Performance as Affected by the Valve Gear.
XVII.—Action of the Counterbalance.
XVIII.—Machine Friction.

5. *Locomotive Performance.*
XIX.—Performance as Affected by Throttling.
XX.—High Steam Pressures.
XXI.—Performance as Affected by Diameter of Drivers.
XXII.—Atmospheric Resistance to the Motion of a Railway Train.
XXIII.—A Generalization Concerning Locomotive Performance.

Portable Air Compressors for the Panama Canal.

The Panama Canal Commission recently placed an order with the Rand Drill Company, of New York, for two portable air compressors, which embody some features of distinct novelty. These machines are intended to operate pneumatic tools in general repair work in the Canal service. It is also expected that they will be found of great assistance in erecting the heavy machinery which of necessity will be delivered in sections along the line of work.

The illustrations give a very good idea of the arrangement of these compact little plants. The prime mover is a 16-h.p. gasoline engine. It is mounted on two steel channels, which constitute the frame of the truck. The engine shaft has at one end a heavy flywheel 4 ft. 8 in. in diameter; at the other end is a driving gear fitted with a friction clutch. Below and at one side of the engine a small Rand single stage air compressor is mounted, fitted with the usual mechanical intake and automatic discharge air valves. The crank gear of the compressor meshes directly with the driving gear of the engine and a valve rod operates the air valve gear by means of a back crank. The engine is started unloaded, with the friction clutch free. When full speed is attained, the clutch is thrown in and the load on the air compressor assumed. Gearing is such as to give the compressor a speed of 150 r. p. m., at which the displacement of the compressing cylinder is 60 cu. ft. of free air per min., which is delivered at a pressure of 100 lbs.



End View.

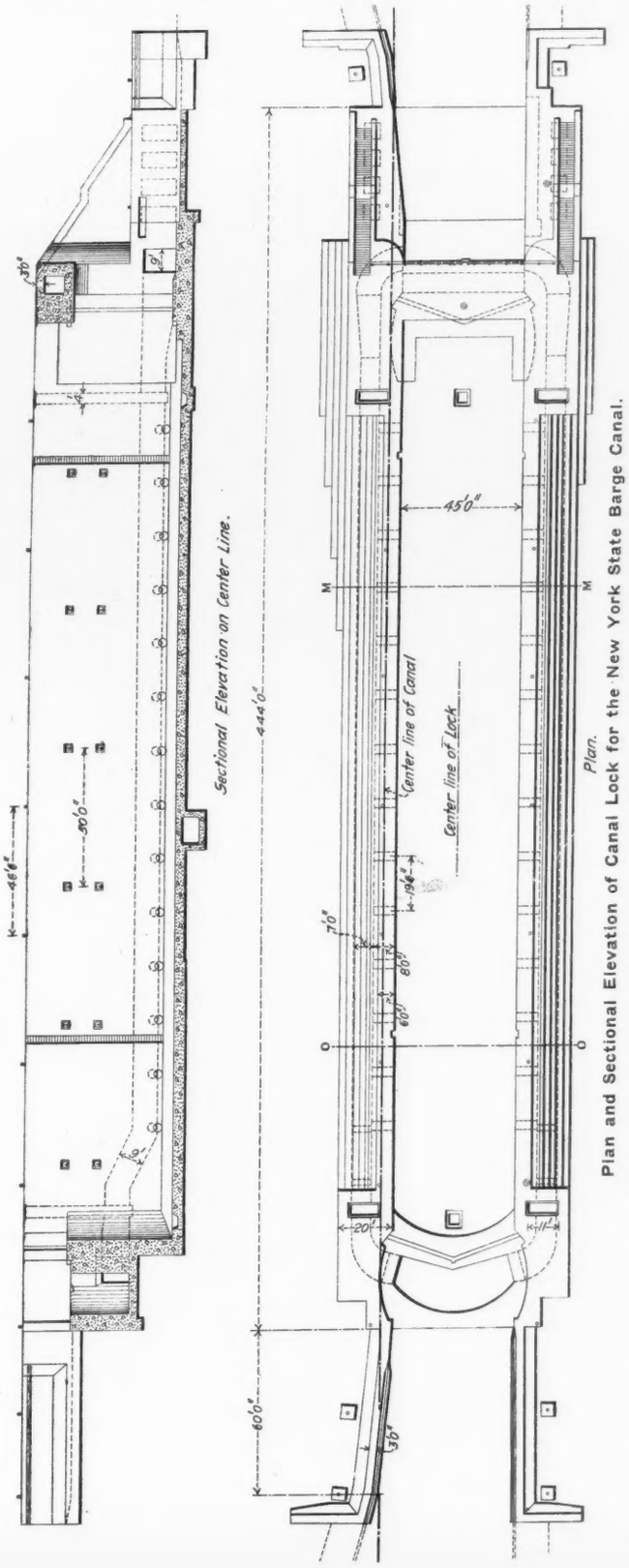
A novel feature of this equipment is the method of cooling circulating water for the engine and compressor cylinders. While provision is made for connection with an outside source of water wherever available, it has also been arranged for the machine to carry its own water supply. A rectangular open tank holding about 100 gallons of water is mounted on the truck in front of the engine. A small pump driven from the engine shaft draws water from this tank and circulates it through the cylinders of the engine and compressor. This water, heated by contact with the cylinder walls, flows upward to a perforated pipe elevated above the supply tank. It is here discharged through a series of fine holes and flows downward over a sheet of burlap to the tank below, being cooled by evaporation by exposure on a thin sheet to the open air. An air receiver 18 in. by 4 ft. 6 in. is suspended beneath the truck and between the axles. A gasoline tank with a capacity of about 30 gallons is hung from the truck in the rear. The entire machine runs on steel wheels. The total weight of this compressor outfit is 8,500 lbs. It has a wheel base 7 ft. long, with a tread of 5 ft.

The New York State Barge Canal.

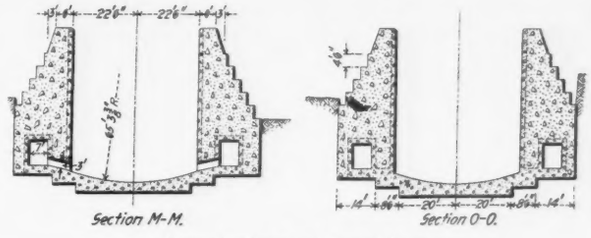
A general description of the proposed barge canal across the State of New York was printed in the *Railroad Gazette* of April 8, 1904. Since this description was printed a few changes have been made in the plans, such as widening the locks and altering locations in order to eliminate as many railroad crossings as possible. An important change in location which eliminates two grade crossings on the New York Central & Hudson River Railroad was made at Rome. Here, instead of taking the course originally proposed, the canal passes through Utica toward Rome on the north

of the New York Central. It leaves the river flats east of the Rome Locomotive Works and passes to the north, where it enters the Mohawk river. The route then passes along the Mohawk river to a junction with the present Black river canal and down that canal to the present Erie canal through Rome. As already stated in the *Railroad Gazette*, work on the canal is done under the direction of State Engineer Henry A. Van Alstyne and Superintendent of Public Works N. V. V. Franchot. The work in the State Engineering department is under the direction of Henry C. Allen, Special Deputy State Engineer, and W. B. Landreth, Special Resident Engineer. All engineering questions are passed upon by an advisory board of consulting engineers, composed as follows: Edward A. Bond, Chairman; W. A. Brackenridge, E. L. Corthell, Colonel Thomas W. Symonds, U. S. A., and Chief Engineer A. B. Fry. Work is under construction on six contracts, as follows: Contract No. 1, Hudson river work at Fort Miller, contractor Lindon W. Bates, contract price $605,000; contract No. 2, two locks 34-ft. lift each, with the connecting canals at Waterford, N. Y., contractor the Ferguson Contracting Company, contractor's bid $852,300; contract No. 3 land line and one lock at Fort Miller, contractor Sundstrom & Stratton, contractor's bid $670,500; contract No. 4, five miles of canal at the east end of Oneida Lake, contractor Lindon W. Bates, contractor's bid $727,000; contract No. 5, river work on the Seneca river near the Montezuma Marshes, contractor Lindon W. Bates, contractor's bid $382,000; contract No. 6, five miles of heavy rock work in the western city limits of Rochester, contractor F. A. Maselli & Company, contractor's bid $1,006,000. Work is progressing under these contracts and surveys have been completed for detail plans on about 300 miles of canal. Contract plans will soon be submitted for bids for three additional locks in the vicinity of Waterford and two dams and two locks on the Oswego river at Fulton. It is expected that plans will be completed by April 1st for at least 40 million dollars' worth of work. The legislature has already appropriated $10,000,000. This will pay for the contracts let, with something to spare. The state will be asked for another appropriation of from 30 to 40 millions very shortly. At the present time, there are about 350 engineers of various grades at work on the canal.

Thus far, the work contracted for has been let at about 17 per cent. under the engineers' estimates. Recently the canal authorities have decided to make all locks 45 ft. wide in the clear instead of 28 ft. wide as called for in the original plans. Because of the changes in location and plans, it is found that the extra expense incurred by larger locks will not increase the estimated final cost. The accompanying illustration shows the general design of the locks, of which about 52 in all will be used. It is estimated they will cost about $200,000 apiece. The total length of the canal is 440 miles, and it is expected that it will be completed in about seven years.



Plan and Sectional Elevation of Canal Lock for the New York State Barge Canal.



Cross-Sections of Canal Lock.

The following table comparing the principal quantities used in the estimates for the state barge canal and those for the Panama canal, is of interest at this time. The quantities used on the Panama canal are those given in Professor Burr's "Ancient and Modern Engineering and Isthmian Canal," page 458.

Principal Quantities of the Estimates for the New York State Barge Canal and the Panama Canal.

Items.	Quantities. Barge canal.	Panama Canal.
Dredging	57,676,756 cu. yds.	27,659,540 cu. yds.
Dry earth	54,286,888 "	14,386,954 "
Soft rock	7,655,974 "	39,893,235 "
Hard rock	387,820 "	8,806,340 "
Rock under water	2,762,963 "	4,891,667 "
Embankment and backfilling	9,455,408 "	1,802,753 "
Totals	132,225,809 cu. yds.*	97,440,489 cu. yds.
Concrete	3,243,105 cu. yds.	3,762,175 cu. yds.
Granite	9,778 "	13,820 "
Iron and steel	164,962,620 lbs.†	65,248,900 lbs.
Excavation in cofferdam	428,666 cu. yds.*	7,260 cu. yds.
Pneumatic work	.....	108,410 "
Other items.		
Excavation of structures	274,912 cu. yds.	.....
Puddle	2,243,933 "	.....
Sawn timber	93,756,000 ft., B.M.*	.....
Round spruce timber	4,176,000 lin. ft.	.....
Oak piling	53,600 "	.....
Riprap	1,628,967 cu. yds.	.....

*Does not include work for dams, bridges, highway, railway, and stream changes and some other small items.
†In bridges only.

Disastrous Collision at Rock Springs, Wyoming.

On the morning of December 7 a butting collision between Union Pacific eastbound passenger train No. 2 and a westbound freight train, five miles west of Rock Springs, Wyo., wrecked both engines and destroyed a mail car, a dining car and one other car of the passenger train, and the wreck took fire and was mostly burnt up. The freight train had received an order to wait at Ahsay for four eastbound passenger trains but waited for only three. Nine trainmen were killed and eight passengers and 11 employees were injured. The killed included the engineman of the freight, one brakeman, three cooks, the electrician, his assistant and two mail clerks.

Plans for the United Engineering Building.

The committee of the United Engineering Society, appointed to supervise the preparation of plans for the new Engineering Building in New York to be built by Mr. Andrew Carnegie for the joint use of the American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers and the Engineers Club, has prepared a report outlining the accepted plans. In the public competition instituted by this committee 26 sets of plans for the building were submitted. From among the competitors the committee selected Hale & Rogers and Henry G. Morse as Associate Architects for the three engineering societies, and Whitfield & King as architects for the Engineers Club.

The frontage of the Engineering Building on 39th street between Fifth and Sixth avenues is 125 ft. and the lot is 100 ft. deep. The building law of the city of New York requires that a building shall occupy only 85 per cent. of the lot area. Advantage was taken of this requirement to have space on all sides of the building, thus giving the building a monumental appearance. The building utilizes 115 ft. of the 125-ft. front, and 90 ft. of the 100-ft. depth.

The Engineering Building must meet requirements in five directions:

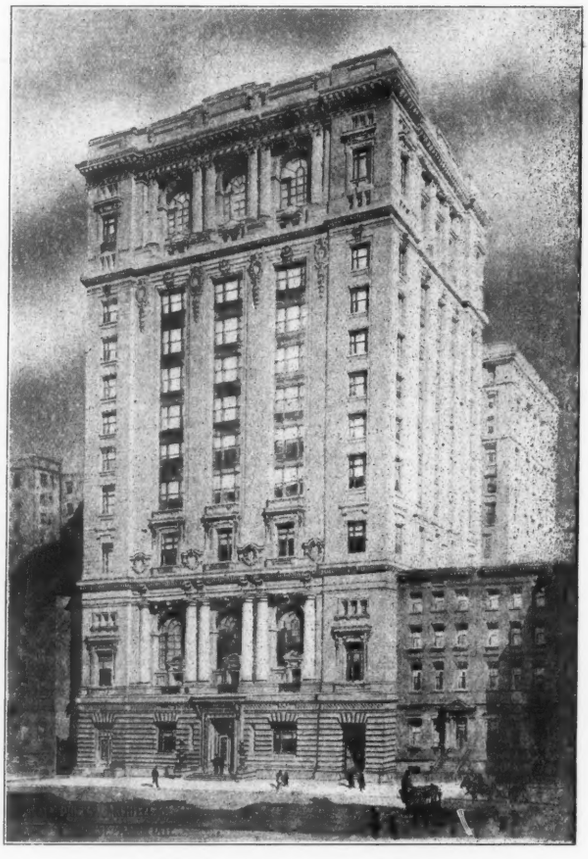
1. It must serve the convenience of each of the three individual societies. This has been secured by the proposed arrangement of society office floors, each society having one whole floor for its use. The working offices of the representatives of the society, the reception room, board and committee rooms, important elements of the life of the society, are on the desirable south front and have windows which look to the eastward.

2. The building must supply to the three National Societies and also to such other organizations as may be invited to participate in its benefits as associates, such meeting rooms and auditoriums as will be required for the annual meetings, the public reading and discussion of papers, and for scientific lectures and demonstrations. In view of the number of participant societies for which provision has been made, the committee has arranged for a number of assembly rooms suitable for various uses. One of these, primarily designed for the National Societies' meetings and for those of other large bodies, has been made to accommodate 1,000 persons. This limit is set as being as large a number as can be expected to hear clearly the voice of a speaker. The location of this large auditorium is on the first floor above the street, so as to make elevator service for it unnecessary. A large foyer and generous corridors give ample space for withdrawal from the large assembly hall. Ample provision for exit also at the four corners of this floor is a desirable provision for safety. To enable auditors in the back of the auditorium to see clearly such diagrams and illustrations as may be on the stage the seats are arranged on a grade conforming to best modern practice in theatres. This parterre arrangement enables coat-rooms to be provided, opening from the outer corridors, and special consideration has been given to secure rapid service with large numbers in attendance. The large auditorium floor is reached from the great central rotunda on the street floor by generous stairways, and it can also be reached from carriages entering the driveway and moving continuously as they receive or discharge their passengers. The room for preparing apparatus and exhibits for the stage is conveniently served by a large freight elevator, so that heavy machinery and apparatus can be easily handled. On the floor above the large auditorium are two assembly rooms occupying the principal portion of the area. These assembly rooms may be used independently for lecture purposes, or one may be made auxiliary to the other and used as a foyer or conversation room. The two small rooms adjoining may be used in common when desired, as, for instance, for purposes of general reception or conversazione. Auxiliary smaller rooms on this floor are provided, and provision is made for the service necessary for light refreshments or luncheon. On the floor above a number of small lecture halls are provided suitable for ordinary meetings of scientific and engineering societies, and for meeting of sections at the time of general conventions of national organizations. It is expected that there will be a great demand, especially for the small meeting rooms, for scientific purposes. They will be supplied with electric current, with compressed air and with gas and water. The meeting rooms of all sizes will be fitted for the use of the projection lantern, and will be unique in their completeness for the purposes for which they are intended. The board rooms of the society floors will be large enough for holding small professional meetings when occasion may require.

3. In the planning of the building provision has been made on the two upper floors for the libraries of the various societies. The entire top floor is to be devoted to reading and reference rooms, to working alcoves, to rooms for photographic reproduction, and for drawing and similar library work. The roof will be specially constructed to secure the best illumination. The location of the reading rooms at the top of the building will be quiet, cool, airy, and free from dust. The floor below the library reading rooms will be devoted to the book stacks.

4. The building is also to furnish office accommodation for a large and continually increasing number of societies which have engineering or some other department of science as their principal object; such are, for example, the New York Electrical Society, Society of Naval Architects and Marine Engineers, Heating and Ventilating Engineers, American Gas Light Association, National Electric Light Association, Society of Chemical Engineers, Association of Edison Illuminating Companies, and many others. For these organizations the building will offer office areas of varying sizes, whose arrangements will be adjusted to the requirements of such participants. Such participants will have use of the auditoriums of the desired size.

5. By means of the driveway extending completely around the building access is had on the street level and under cover to the freight elevator, both for boxes of books and for other merchandise moving inward and for mail-sacks moving outward. This driveway also serves for carriage access to the auditorium and passenger elevators. It gives facility for unloading by gravity to the coal pockets of the heating plant without handling. The general convenience of the building is also served by the receiving and shipping



The New United Engineering Buidling.

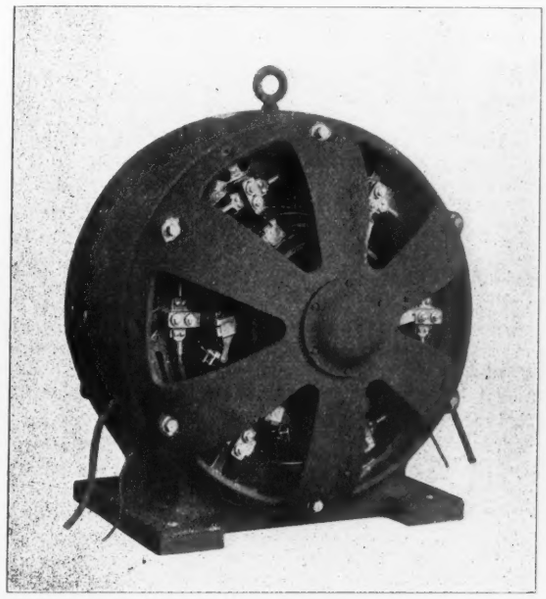
office at the rear, through which all goods in and out will be handled. There is also the bureau of information, at the right of the main entrance, where general questions can be answered, visitors directed, and some routine business transacted. This office will also be a suitable location for the telephone exchange, the telegraph and the sub-postoffice.

By a business arrangement formed under legal advice and forming part of the deed to the property to the east of the building, a restriction has been placed which prevents the erection on that lot of a building more than 60 ft. high. This restriction runs with the land and secures light and air for the building on its eastern front above the third floor. The west wall is built 10 ft. within the property line, so that openings for light and air should always be left on that side and on the rear, even if high buildings should be hereafter built on adjoining property to the west and the north. The committee contemplates finishing the building on all four sides and not merely on the south facade, in order that its monumental character may be seen and recognized from every point of view.

The contract for construction was signed in July, the excavation for the foundations was started at once, and the work of construction has now commenced. The contract limit is 15 months to date of expected completion.

Some New Inter-Pole Variable Speed Motors.

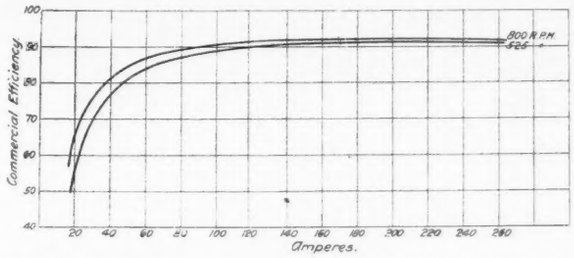
The Electro Dynamic Company, Bayonne, N. J., has recently delivered to the Philadelphia Rapid Transit Company a number of large inter-pole variable speed motors. They are for a 575-volt circuit and have each a capacity of 120 h.p. at 525 to 800 r.p.m. They are six-pole machines, fitted with a small inter-pole between each of the main poles, as shown in the accompanying illustration. The general design is similar to the four-pole machines which were described and illustrated in detail in the *Railroad Gazette* of March 3, 1905. The variation in speed in this type of motor is produced by changing the strength of the shunt field. They operate at all loads and speeds within the range given absolutely without sparking. The small inter-poles always give the proper fringe for commutation, as it increases with the load. In this respect the inter-pole motor is quite different from the motor of usual design, where the fringe



A 120-h.p. Inter-Pole, Variable Speed Motor for the Philadelphia Rapid Transit Company.

of the main poles for a given setting of the brushes is correct for one load only, and also in one direction of rotation only. With the inter-pole construction no change is required for the different loads, or for change of direction of rotation.

In the efficiency curves shown it will be noticed that at the high speed the efficiency is higher than it is at low speed. This is due to the fact that at high speed the shunt field loss is materially reduced, and also the losses due to hysterisis, eddy currents and friction. In general the losses due to hysterisis, eddy currents and friction are measured together, and although the friction loss is higher at the high speed, the total of the three losses is considerably



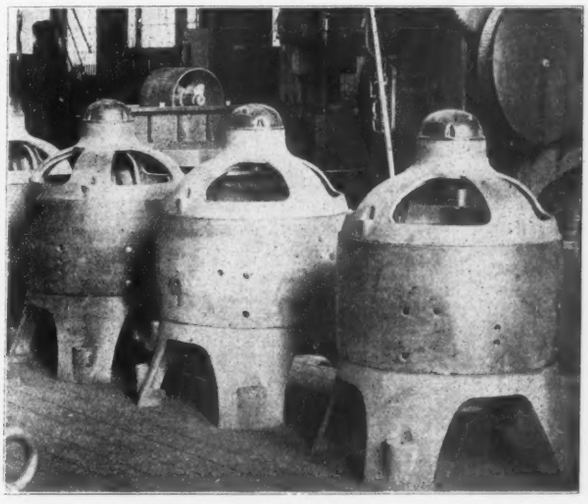
Efficiency Curves of 120 h. p. Inter-Pole Variable Speed Motor.

less at the high speed than at the low speed. If the machines had been fitted with ring oil bearings instead of ball bearings, the increased friction loss at high speeds would have considerably lowered the efficiency curve. It will be noticed also that the efficiency for light load is very high, showing over 80 per cent. for quarter load. In consequence the motors show unusually high efficiency for the average loads required in actual service.

The Electro Dynamic Company also has under construction a number of vertical motors, a few of which are illustrated herewith. The smaller size now under construction is for 50 h.p. at 400 to 750 r.p.m., and the larger size is for 100 h.p. at 400 to 750 r.p.m., all for 220-volt circuits. The motors are similar to the horizontal motors except that in addition to the ball-bearings for the radial thrust there is a ball-bearing for taking the vertical load.

Consolidation Locomotive for the Baltimore & Ohio Railroad.

In the issue of Dec. 1 a brief description with an illustration was published of the heavy consolidation locomotives that the American Locomotive Co. has delivered to the Baltimore & Ohio. Since the above date further particulars of considerable interest have been received regarding these engines. The tractive power, as already stated, is 41,100 lbs., and as they are intended for heavy service great pains were taken in the working up of the design. The fundamentals that were laid down at the start were that the first cost should be as reasonable as possible and not be enhanced by extra or unnecessary work, while the efficiency for the service to be performed should be kept at a maximum. Then, that the adhesive weight should be all that the strength of the track and the clearances would allow. With these points carried into effect it is expected that the machines will handle the heaviest gross tonnage that it is practicable to haul, at the highest speeds. Of course, in all this, the economy of fuel and maintenance was kept in mind, the latter involving the use of the fewest number of parts. In short, the design had to be that of a freight locomotive, adapted



Inter-Pole, Variable Speed, Vertical Motors Made by the Electro-Dynamic Co.

to hauling a heavy tonnage over a road both level and mountainous and of varying degrees of curvature.

The boiler is of simple design, and arranged for a very free circulation of the water. For this purpose the throat sheet has a rapid slope to the front, widening from 4½ in. at the mudring to 7 in. at the bottom of the shell. In the same way, the water legs widen from 4½ in. to 6 in. The inward slope of both sheets gives the steam an opportunity to free itself from the surface on which it is formed. The door opening is made by flanging the two sheets and using a supplementary sheet ring in addition to the heavy stiffening ring to which the door and its fastenings are attached.

The grate is made in one plane, dropping 10 in. from the back to the front in its length of 9 ft. 1 in. The fuel used will be either gas or soft, run-of-mine, bituminous coal. The rigid wheel base was made as short as would be consistent with the number and diameter of wheels used. It is 16 ft. 8 in., and the wheels are 60 in. outside the tread.

Bushings have been applied to the new cylinders in order to secure a good wearing metal for the pistons. This makes it possible to insure strong walls for the shell of the cylinder itself as well as for the saddle. The castings of the half saddle extend down to a level with the center of the cylinder and are provided with front and back flanges to which staggered bolts are fitted.

The frames have a strong section due to the ample dimensions of width and depth; these measurements at the pedestals being 5 in. and 6 in. respectively. The driver brake is arranged with the shoes applied to the front of the wheels in the usual manner, and with the push-down type of driver brake cylinder, having the cranks and connections so placed as to be readily accessible for repairs, cleaning and adjustment.

There are two air storage reservoirs suspended from the running board on either side and having a combined capacity of 60,000 cu. in. It is expected that this in connection with an 11-in. air pump should be able to give ample means for properly handling the longest trains down the grades of the mountains. The main and side rods have been made of a heavy section around the brasses, knuckle joint pin and other openings.

The crosshead is designed so that the vertical wear may be taken up without disturbing the alinement of the guides. In this

connection, attention is called to the fact that the piston rods and guides are so disposed that the metallic packing can be applied when the crank-pins are on the front dead center, and the piston packing rings can be applied without disconnecting the piston from the crosshead.

Brass is used for the eccentric straps and for the shoes and wedges in connection with the cast-steel driving boxes. The Walschaert valve gear having proved so satisfactory in the case of the heavy Mallet compound No. 2,400, it has been applied to five of these engines for the purpose of making a comparison and securing data upon which to base a decision as to the advisability of using it instead of the Stephenson gear on future equipment. The cab is large, roomy and convenient, special attention having been paid to the matter of ventilation for tunnel service.

The tender underframe is of deep channels, with the cistern equipped with collision angles and iron coal gates, so as to reduce the liability of the tank or coal being forced ahead over the tender-frame in the case of an accident. The cistern is formed with a deep water bottom extending to the front end of the frame in order that an ample proportion of weight may be maintained over the front tender trucks at all times. The floor has also been so arranged that all coal will be brought down by gravity to a point as near the coal gates as possible.

A first sample locomotive was built in advance of the regular order and was put into service in August last. This gave an opportunity for examination and discussion by the three committees mentioned in the previous article, as well as to make a practical demonstration of the machine in service so that any minor changes that might be suggested could be made.

The reports made by these committees contained many valuable suggestions, which, coming from the people who will be in direct charge of the maintenance and operation of the locomotives over level and mountainous divisions, have been of considerable benefit in producing a design that the motive power people feel will give the most satisfactory general results.

It is felt that this method of producing locomotive equipment by a combination of drawing office and practical shop and operating knowledge of locomotive design and construction will result to the best advantage.

In deciding upon types of new locomotives to be built and in designing, only those of maximum power have been considered, and the fewest number of standard types adapted to the present and future needs of the different service and to meet the contemplated physical improvements of the property decided upon. With the above in mind, it was decided to classify the 250 locomotives that have been placed in this order into three groups, five being a switching type for special service, 35 a Pacific type for passenger and fast freight service, and 210 of the consolidation type for slow and fast freight service.

As the principal work to be accomplished by a railroad is the movement of its trains from one terminal to another on time, it is thought that the monthly mileage that can be derived from any class of properly designed, constructed and maintained motive power is limited only by terminal delay and the despatch with which it can be handled over a division, even though the speed, grade and curvature are factors that may largely control the loading of the locomotives, as well as the cost for their operation.

With the demand for faster schedules, the general tendency and more desirable practice has been followed of increasing the diameter of the driver wheels and the length of the stroke, which, combined with a proportionately reduced diameter of cylinder, results in less liability for wear and tear on the track and locomotives, and decreased operating expense due to less revolutions per coupled wheel per mile, and a material gain in reduced boiler and machinery stresses.

The demand for great locomotive tractive power in one unit has frequently resulted in the use of extreme diameters of cylinders, reduced spread of frames, increased distance between centers of cylinders and greater length of rigid wheel base, which proportions have transmitted stresses to the cylinders and connecting frames, that have resulted in a large number of breakages of these parts.

Furthermore, the failure of the higher steam pressures to produce efficient and economical results, in many modern locomotives, has frequently been due to defective boiler, cylinder, frame and motion gear design and construction; excess weight and inferior quality of material applied to frictional parts; neglect in the details of design; inadequate provision for drifting and condensation; priming, method for lubrication, etc.

It was, therefore, kept well in mind that when the steam pressure is not maintained, a locomotive cannot develop its working power, and that the modern type is under the further disadvantage of having to haul an increased dead weight, especially on mountain grades. Therefore, by combining in the new construction features that have been found in practical experience to have met local conditions, and by the elimination of personal preferences, it is believed that a plain, simple, practical design and construction, and one that will give satisfactory results, has been obtained.

The following are a few of the principal dimensions of these engines:

Cylinder, diameter	22 in.
Piston, stroke	30 "
Tractive power	41,100 lbs.
Weight in working order	208,500 "
" on driving wheels	185,900 "
" of engine and tender in working order	345,900 "
Wheel base, total of engine	25 ft. 7 in.
" driving wheel	16 " 8 "
" engine and tender	59 " 8½ "
Heating surface, tubes	2,612.80 sq. ft.
" " firebox	162.26 "
" " total	2,775.06 "
Grate area	56.5 "
Axles, main journals, length	13 in.
" " diameter	10 "
" truck " length	10 "
" " " diameter	6 "
" tender " length	10 "
" " " diameter	5½ "
Boiler, type	Straight top
" outside diameter of first ring	74 7-16 in.
" working pressure	200 lbs.
" fuel	Bituminous coal
Firebox, type	Wide, radial stay
" length	108⅛ in.
" width	75¼ "
" thickness of crown, side and back sheets	⅜ "
" thickness of tube sheet	½ "
" thickness of water space	4½ "
Tubes, material	Charcoal iron
" diameter	2¼ in.
" length	15 ft. 10 "
Exhaust pipe diameter	5¼ and 5½ "
Exhaust pipe, type of nozzle	Single
Piston rod, diameter	4 in.
Stack, diameter	18 "
Stack, height above rail	14 ft. 7¾ "
Tank, capacity, water	7,000 gals.
Tank, capacity, coal	12 tons
Valves, type	Richardson balance
" travel	6 in.
" steam lap	1¼ "
" exhaust lap	⅛ "
" lead in full gear	1-16 "
Wheels, diameter of drivers	60 "
Wheels, diameter of truck	33 "

The engines are equipped with the Westinghouse-American driver brake and an 11-in. air pump, with straight air. Cast-steel is used for the driving boxes, driving wheel centers and some other of the working parts.

1906 M. C. B. and M. M. Convention.

At a meeting of the joint executive committees of the Master Car Builders' and American Railway Master Mechanics' Associations at the Hotel Manhattan, New York City, Dec. 11, it was decided to hold the next annual conventions of these Associations at Atlantic City, N. J. The Master Car Builders' Association will meet June 13 to 15 inclusive, and the American Railway Master Mechanics' Association June 18 to 20 inclusive. No hotel will be headquarters. The following hotels, members of an association of hotels in Atlantic City, agreed to reserve in all 2,040 rooms, with 825 private bath rooms. The rates for those who will attend the conventions are also listed:

Hotels.	Distance* min.	Total promised Rooms.	Total promised Baths.	Rate of rooms by the day (American), One person Single.	One person Double.	Two persons Double.	Two persons Ex.lrge	Baths.
Royal Palace	13	125	60	$3.50	$4.00	$7.00	$8.00	Without
Royal Palace	..	...	...	5.00	$6-$7	10.00	12.00	With
Rudolf	4	310	110	3.50	4.50	6.00	8.00	Without
Rudolf	..	...	...	5.00	6.00	10.00	12.00	With
St. Charles	3½	145	45	3.50	4.50	$6-$9	9.00	Without
St. Charles	..	...	...	6.00	$7-10	$10-14	14.00	With
Seaside	1	90	25	3.50	4.50	7.00	None.	Without
Seaside	..	...	...	5.00	6.00	10.00	12.00	With
Strand	1	135	40	3.50	5.00	7.00	8.00	Without
Strand	..	...	...	5.00	7.00	10.00	12.00	With
Haddon Hall	3	75	20	3.50	4.50	6.00	None.	Without
Haddon Hall	..	...	...	5.00	6.00	10.00	12.00	With
Chalfonte	3	100	30	3.50	4.50	6.00	8.00	Without
Chalfonte	..	...	...	None.	6.00	10.00	12.00	With
Young's (European)	5	150	100	1.50	....	3.00	....	Without
	..	...	...	2.50	...	3.50	4.00	With
Windsor	9	110	30	4.00	5.00	8.00	10.00	Without
Windsor	..	...	...	None.	6.00	11.00	12.00	With
Traymore	9	105	35	3.50	7.00	7.00	8.00	Without
Traymore	..	...	..	5.00	10.00	10.00	12.00	With
Brighton	11	25	..	$4-$6	None.	$8-12	None.	Without
Brighton	..	...	..	$6.50-9	None.	$11-18	None.	With
Marlborough	12	345	225	4.00	5.00	8.00	None.	Without
Blenheim	..	...	..	6.00	7.00	10.00	$14-20	With
Dennis	13	150	50	$3.50-4	4.50	$6-$7	8.00	Without
Dennis	..	...	..	5.00	7.00	10.00	12.00	With
Shelburne	13	175	45	3.50	4.50	6.00	8.00	Without
Shelburne	..	...	..	5.00	6.00	8.00	12.00	With

*Distance from pier.

The exhibits will be placed on the east side of the big pier. Applications for space should be made to L. B. Sherman, Secretary of the Supplymen's Association, Old Colony Building, Chicago, Ill.

Washington Correspondence.

Washington, Dec. 12.—Little progress has been made during the past week in the direction of preparing a railroad rate bill. The Senate Committee is waiting for the publication of the digest of the testimony that was taken during the hearings of last spring, and has not had a meeting since last week. The House Committee on Interstate and Foreign Commerce was appointed on Monday and met on

Tuesday, but did not take up the rate question, nor did it adopt any programme for its consideration. The question of whether or not the House Committee shall have hearings before undertaking to report a bill has not been decided. There are three new members on the committee: Messrs. Gaines, of West Virginia, Republican; and Bartlett, of Georgia, and Russell, of Texas, Democrats. It may be that hearings will be considered necessary for the benefit of these men, who are not as familiar with the subject as are the men who have served on this committee in former Congresses.

Republican leaders in both houses are working with the idea of lining up the members of their party in support of a bill and putting it through Congress as a party measure. This will be a difficult task on account of the wide differences of opinion at present existing in the party, and one of the reasons for going slow at the beginning of the session is that the leaders desire to have their men lined up as well as possible before too many of them have committed themselves positively for any particular measure. It now seems probable that if the House Committee shall decide to give hearings it may be late in January before a bill has been reported to either House.

It is impossible to keep the subject entirely in the background, however, and on Monday of this week the Senate gave the greater part of the session to a railroad debate. The discussion was precipitated by the introduction of a bill by Senator Tillman, of South Carolina, one of the Democratic members of the Committee on Interstate Commerce, which he was allowed to explain before its reference to the Committee. The object of the Tillman bill is to confer the power to make maximum reasonable rates on the Interstate Commerce Commission in the shortest form possible. It contains no provisions for the judicial review of the acts of the Commission, allowing the courts the full power in this respect that they now exercise. This measure served to bring up and concentrate the attention of the Senate on the one fundamental question of whether giving the Commission power to fix a rate for the future would be such a delegation of legislative power as Congress could not constitutionally make.

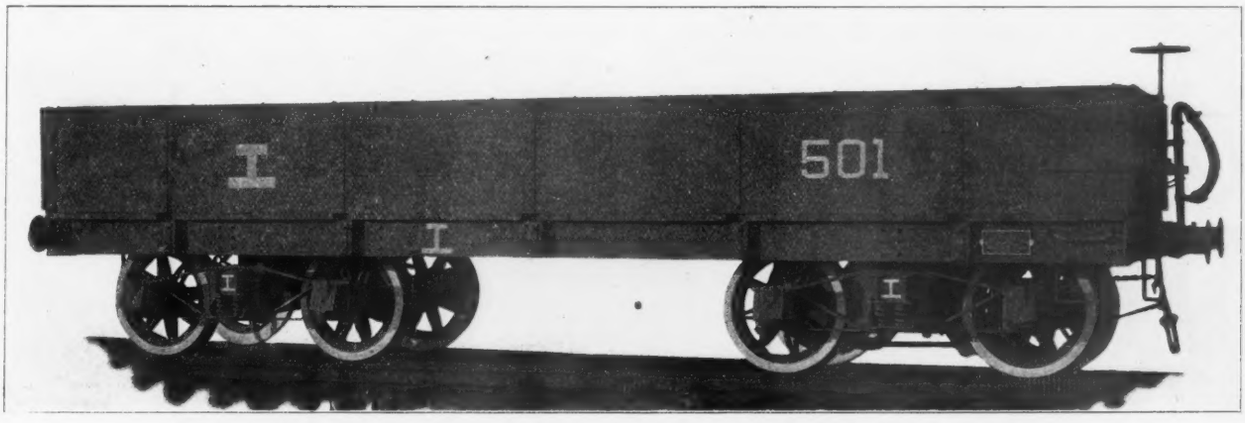
It is manifest that if Congress cannot delegate this power to an executive body, all of the bills that have been proposed conferring the rate-making power on the Commission must be abandoned and some measure framed on the lines of the Foraker bill must be adopted. It is claimed, however, that the plan proposed by Senator Elkins avoids this constitutional difficulty by making the fine distinction between an order of the Commission directing the carrier to substitute a new rate and an order directing it to modify the existing rate. Senator Foraker took the leading part in Monday's debate, contending that giving the Commission power to fix a rate for the future would constitute an unconstitutional delegation of legislative power unless Congress should more accurately define the standard by which rates were to be made than by simply providing that they should be reasonable. He contended that under such a definition of the legal standard the Commission would exercise discretionary legislative powers, and that if it was to make rates constitutionally Congress would have to set up some exact standard, such as a provision that rates should be so much per ton mile, or that a railroad earning a certain per cent. on its capital should not be permitted to charge above so much, leaving the Commission the simple administrative task of making the necessary calculations and applying the standard.

Such debates may be expected from time to time in the Senate until some bill has been formally reported from the Committee, and it is probable that by that time the constitutional questions involved in the various pending propositions will be thoroughly threshed over. It is apparent that there are at present wide differences of opinion among the lawyers of Congress on these questions, and these differences will probably continue until the end of the debate. The attack on the constitutionality of the measures proposing to give the Commission rate-making power was helped along during the week by the filing with the Senate Committee of an exhaustive argument against the constitutionality of the Interstate Commerce Commission bill by Mr. Walker D. Hines, formerly Vice-President of the Louisville & Nashville. J. C. W.

Narrow Gage Coal Cars for Japan.

The Middletown Car Works has recently completed 500 gondola cars for the Imperial Government Railways of Japan. These are part of an order for 1,900 cars placed in this country by the Japanese Government last June. The Western Car & Foundry Co. built 900 box cars, and the remaining 1,000 gondolas were divided between the American Car & Foundry Co. and the Middletown Car Works. The entire equipment is narrow gage, 3 ft. 6 in.

The car illustrated has a steel underframe and is designed for a capacity of 18 tons. The frames are built up from 10-in. and 6-in. channels, and the end sills are pressed from ¼-in. steel plates. The truck bolster consists of two 7-in. I beams joined by steel cover plates and supported by eight coil springs, which rest on a 12-in. channel spring plank. The brakes are operated by hand and are applied to one truck on each car. The draft gear is made up of a drop-forged draw hook, which pulls against a cast-steel draft lug riveted to the two center sills. The cars also have standard English buffers for compression. The spoke wheels and axles were made in England and shipped to this country, but the remaining parts are American design and construction. The steel and malleable castings were by Benjamin Atha & Co., and the National Malleable Castings Co., while the truck and draft springs were furnished by the Railway Steel-Spring Co. The general dimensions of the car are as follows: Length, 28 ft. 9¼ in.; height, 5 ft. 11¾ in.; diam. of wheels, 34 in.; weight, 18,500 lbs.; depth of inside, 2 ft. 6 in.; width of inside, 7 ft. 2 in.; total wheel base, 21 ft. 4 in.



Steel Underframe Gondola, Narrow Gage, for the Imperial Government Railways of Japan.

Fast Runs of 1905.

At least nine new high speed records have been made on the railroads of the United States during the present year and, if our readers are willing to accept our guess that no more "record breaking" will be done before the first of January, they will doubtless be interested at this time in reading a list of these runs. As in the case of most other performances of the kind, it is impossible to give all the particulars that would be desirable, and entirely out of the question to make discriminating comparisons between different runs, except in a rough way. Considering only distance and time, the times here shown are "world records" in each case.

In the accompanying table these runs are shown in the order of their length, the longest first; and the rates of speed vary from 44.3 miles an hour to 79 miles.

The first run in the list, that which was made to carry Mr. E. H. Harriman and party from San Francisco to New York, was not undertaken with a view to breaking records, and, as will be seen by details given at the end of this article, sent to us by an officer of the Union Pacific, the rates of speed have probably been exceeded on every one of the divisions which the train traversed. Nevertheless, the time through for the whole distance across the Continent was much better than has ever before been made. Though each of the roads interested disclaimed any intention of beating former records, it is clear that the special train was favored, especially on single track lines, in a way to enable it to make much better time than is made by regular trains. The Jarrett & Palmer

special of 1876, from Jersey City to Oakland, ran 3,311 miles at 39.53 miles an hour.

The next in order of length was the run made over the Atchison road to carry a Death Valley miner of Southern California, who took this way to get rid of some of his money. The best previous run from Los Angeles, Cal., to Chicago was on March 27, 1900, 38.55 miles an hour. This also was done for an individual, or small party.

The third item, that of the regular 18-hour trains of the New York Central, is introduced for the sake of completeness, although we have no precise record of the very best speed made by this train through between termini. In several instances the train has lost time and has subsequently made up the loss, but this did not, of course, affect the rate of speed through, because the trains have never yet been compelled to begin their trip behind time. The New York Central is to be credited with higher speed than its competitor on these regular runs, because its line is longer than that of the Pennsylvania. These 18-hour trains have on many occasions hauled more than their regular number of cars for a part of the distance, and the use of dining cars for a part of each trip makes it impossible to definitely state any weight which can be used in a comparison of speeds.

The next item in the table, the fourth, shows what the 18-hour trains can do when they are behind time. On this run the speed from Harrisburg to Altoona (132 miles, over a line largely up grade and none of it down grade) was 58.7 miles an hour. The figures for this run, which are official, are somewhat different from those originally reported. The run is by far the best on record for so great a distance as 700 miles.

The fifth item, the Lake Shore special run, is already well known to our readers.

The sixth and the seventh also refer to a special run, and it will be observed that there was one more car than in item five. In item six there was no stop at Clarke Junction.

The eighth run, that on the Atlantic City road, is remarkable not so much for the few seconds saved over previous records, as for the weight of the train. The Atlantic City engines now do

FAST RUNS ON AMERICAN RAILROADS IN 1905.

Date of starting.	Railroad.	From	To.	Distance, miles.	Time h. m. s.	Speed, miles per hour.	Cars No.	Cars Weight, lbs.	Locomotives Type.	Locomotives Size of cylndrs. ins.	Locomotives Weight on drvrs, lbs.	Reported in *Railroad Gazette*, date and page.
1. Oct. 23.	S. Pac., Un. Pac., C. & N. W., L.S. & M.S., Erie.	Oakland	to Jersey City	3,239.0	73 :12 :00	44.30	..	.....	.....	.....	.....	Nov. 3 ; 137, G.N.S.
2. July 9.	Atch., T. & Santa Fe.	Los Angeles	to Chicago	2,246.0	44 :54 :00	50.00	3	338,000	.....	.....	.....	Sept. 8 ; 234.
3. Daily.	N.Y. Cent., L. S. & M.S.	New York	to Chicago..	964.0	18 :00 :00	53.55	3 to 5	.....	Atlantic.	.....	.....	.....
4. Nov. 3.	Pennsylvania	Harrisburg	to Chicago.	717.0	12 :49 :00	56.00	3 to 4	.....	Atlantic.	.....	.....	Nov. 10 ; 146, G.N.S.
5. Jun. 13.	Lake Sh. & Mich. So..	Chicago	to Buffalo....	525.0	7 :33 :00	69.53	3	350,000	.....	.....	.....	June 30 ; 751.
6. Oct. 24.	Pennsylvania	Crestline	to Clark Junc	257.4	3 :27 :20	74.55	4	520,000	Atlantic.	20½x26	109,000	Nov. 17 ; 456.
7. Oct. 24.	Pennsylvania	Crestline	to Ft. Wayne	131.4	1 :41 :20	77.81	4	520,000	Atlantic.	20½x26	109,000	Nov. 17 ; 456.
8. May 14.	Atlantic City	Atlantic C.	to Camden.	55.5	0 :42 :33	78.26	5	460,000	Atlantic.	21x24	99,000	June 2 ; 597.
9. Jun. 8.	Pennsylvania	E. Tolleston	to Dnldson	50.6	0 :38 :00	79.00	3	.....	Atlantic.	20½x26	109,000	Aug. 11 ; 123.

as well with five or six or more cars as in the early days was done with four cars. The engine in this case carried 225 lbs. steam pressure.

Item No. 9 records a run in which there was a flying start; and there was no stop at Donaldson.

It is about as difficult to make comparisons of the locomotives used to haul these trains as to compare the roads over which they travel; and, indeed, for the longer runs no accurate data are at hand. On the Atchison run the engines were, of course, changed many times, and in some of the mountain districts helping engines had to be used for considerable distances. We give the principal dimensions of the engines used on the runs of October 24 on the Pennsylvania Lines West of Pittsburg, and it may be said in a general way that nearly or quite all of the engines used, for all of the runs shown in the table, are of large modern types; for all of the roads named own considerable numbers of these engines, and would naturally use their best for these notable performances. Most of the engines used had cylinders of from 20½ in. to 22 in. in diameter and from 24 in. to 28 in. stroke. The driving wheels of most of the Atlantic type and Pacific type engines were of 79 in. or 80 in. diameter, but the Atlantic City engine had 84-in. wheels. The weight on the drivers of the Atlantic type engines was from 109,000 lbs. to 130,000 lbs., except on the Atlantic City road. On the Lake Shore (items 3 and 7) Pacific and Prairie type engines were used on some of the divisions. On the Atchison 10-wheel engines were used in New Mexico and west of there, and four-cylinder balanced compounds in Kansas and east thereof. The Atlantic City engine, as before stated, was worked at a higher steam pressure than any of the others, so far as reported.

A condensed schedule of run No. 1 is given below. There were, of course, many stops besides those here shown. In connection with this run it is of interest to note that Mr. Harriman and his party made a fast trip across the Pacific Ocean in the steamship "Siberia" of the Pacific Mail Steamship Company, so that they traversed the 7,775 miles between Yokohama and New York in 13 days, 16 hours and 43 minutes. Yokohama time is about 6 hours 40 minutes slower than San Francisco. San Francisco uses Pacific time, one hour slower than Mountain time, two hours slower than Central time, and three hours slower than Eastern time. The "Siberia" cleared Yokohama lightship at 5.29 p.m., October 13, and arrived off San Francisco lightship at 10.28 a.m. October 23. The train started from Oakland, east side of San Francisco bay, 5 hours and 2 minutes later. In passing the 180th meridian east of Greenwich the "Siberia" added a day to the calendar.

Special Train, Oakland to Jersey City, Oct. 23-26, 1905.

	Miles.	Time elapsed hrs.	min.	Miles per hr.
Southern Pacific :				
Oakland, Cal. ..Dep. Mon., 3 :30 p.m. P. T.	....	..	..	....
Sparks, Nev. ...Arr. Mon., 10 :51 p.m. P. T.	243	7	21	33.1
Sparks, Nev. ...Dep. Mon., 11 :58 p.m. M.T.				
Ogden, Utah....Arr. Tues., 11 :24 a.m. M.T.	539	11	26	46.9
Union Pacific :				
Ogden, Utah....Dep. Tues., 11 :34 a.m. M.T.				
Green Rvr, Wyo. Arr. Tues., 3 :30 p.m. M.T.	176	3	56	44.7
Green Rvr, Wyo. Dep. Tues., 3 :37 p.m. M.T.				
Omaha, Neb. ...Arr. Wed., 9 :26 a.m. C. T.	824	16	49	49.0
Chicago & North-Western :				
Omaha, Neb. ...Dep. Wed., 9 :44 a.m. C. T.				
Chicago, Ill. ...Arr. Wed., 8 :00 p.m. C. T.	492	10	16	47.9
Transfer to L. S. & M. S. Ry.*	8	1	5	....
Lake Shore & Mich. So. :				
Chicago, Ill. ...Dep. Wed., 9 :05 p.m. C. T.				
Buffalo .....Arr. Thurs., 7 :55 a.m. C. T.	532	10	50	49.1
Erie : Buffalo .....Dep. Thurs., 9 :08 a.m. E. T.				
Jersey City....Arr. Thurs., 7 :42 p.m. E. T.	425	10	34	39.4
Add time consumed in stops at places shown above : 7 + 10 + 7 + 18 + 13 = 55 minutes..	.....	..	55	....
	3,329	73	12	44.3

*Including all stops in Chicago.

Baker Bridge and East Everett.

The Grand Jury of Middlesex County, Massachusetts, on December 7, made a report on the Baker Bridge collision, but found no bill against Engineman Lyons, following the finding of the coroner. Lyons had been arrested on a charge of manslaughter, and had been in jail for about one week, but on the announcement of the report of the Grand Jury he was set free. The Grand Jury finds the railroad company at fault in not requiring trains to come to a full stop at signals indicating that the time interval is too short between trains following one another; in having a rule which does not clearly make it the duty of the rear brakeman to flag a following train, in a situation like that at Baker Bridge; in depending on the time interval, lanterns, flags, fuses and torpedoes, which constitute an inadequate system; and in assigning inexperienced engineers to fast passenger trains. In this connection, the report says:

> If there is an agreement with the engineers whereby the first spare man on the list is to be assigned to the first vacant job, no matter what the character of the service required or the experience of the engineer, such an agreement is in violation of public policy and endangers the safety of the traveling public. The jurors find that no engineer should be permitted to work from 16 to 18 hours or more a day five days in succession.

The Grand Jury declares the men in charge of the accommodation train at fault in not stopping at Baker Bridge. It appears that in making the station stop the engineman ran some distance past the platform, and the stop was in such a position, around a curve, that the tail lights were not so clearly visible as they would have been at the proper stopping place. This train crew is also blamed for not sending a flagman back when the train was within two or three minutes of the time of the following express train. Lyons is found "greatly at fault" but, as before stated, he was not found guilty of manslaughter.

A lawyer, said to be counsel for Engineman Lyons, says that this was the first trip on which Lyons had ever run an express train.

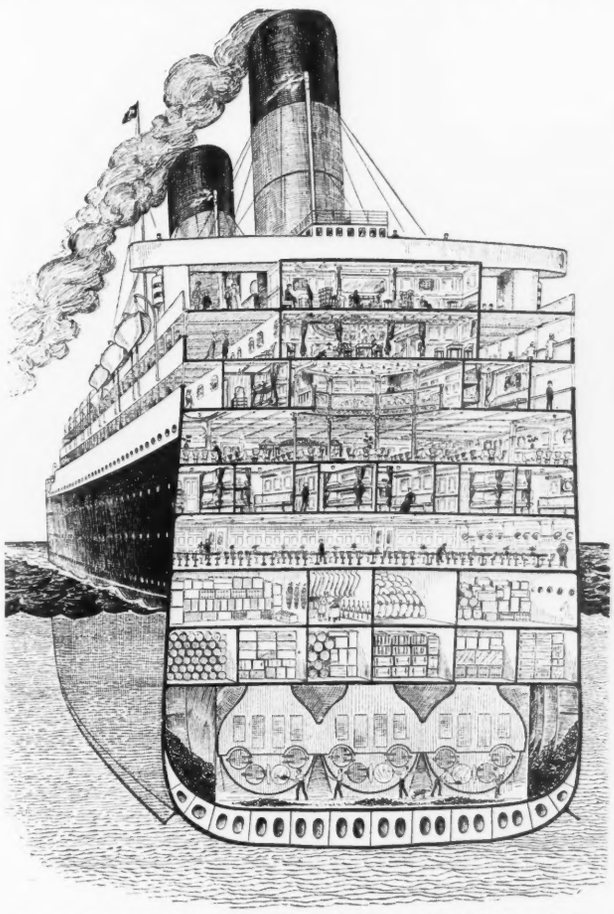
At a hearing before the state railroad commissioners, an officer of the road testified that on Sunday about three-fourths of the men for the trains are usually taken from the spare list. The telegraph operator at Lincoln, less than two miles east of Baker Bridge, testified that the local passenger train passed him at 8:14 and the express at 8:15.

On Wednesday evening, about 6:30 o'clock, three days after the Baker Bridge collision, there was a rear collision on the Eastern division of the Boston & Maine at East Everett, Mass., about five miles from Boston. A suburban passenger train of six cars, bound north, was run into at the rear by a following freight train drawn by two engines. Three of the passenger cars were considerably damaged, and all of the 200 passengers were shaken up; but only 10 or 15 were injured, and these only slightly. The freight train

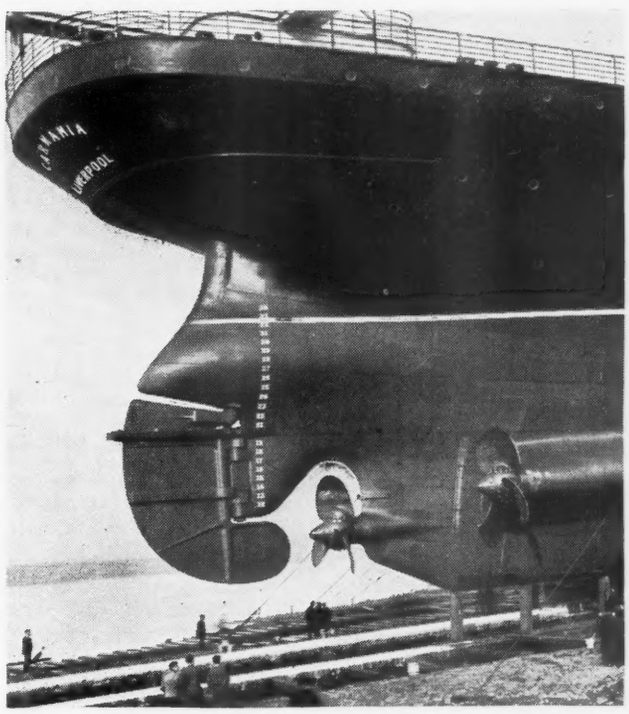
in this case had started from East Somerville, about one minute behind the passenger train, and it had run past three automatic block signals set against it. The engineman of the leading engine, which engine was to accompany this train only to Revere, about six miles, admitted on cross examination that he had disregarded a plain rule in running past these signals without being sure that he saw and knew their indications, and without getting his train under control. The situation of the block signals, measuring back from the point of collision, was as follows: The first one, 2,000 feet back; the next, 8,350 feet back, and the next, 11,980 feet. This engineman had been cautioned by the Master Mechanic that it was a bad night (rainy) and "to be very careful, so that no accident should happen."

The New Cunard Steamship "Carmania."

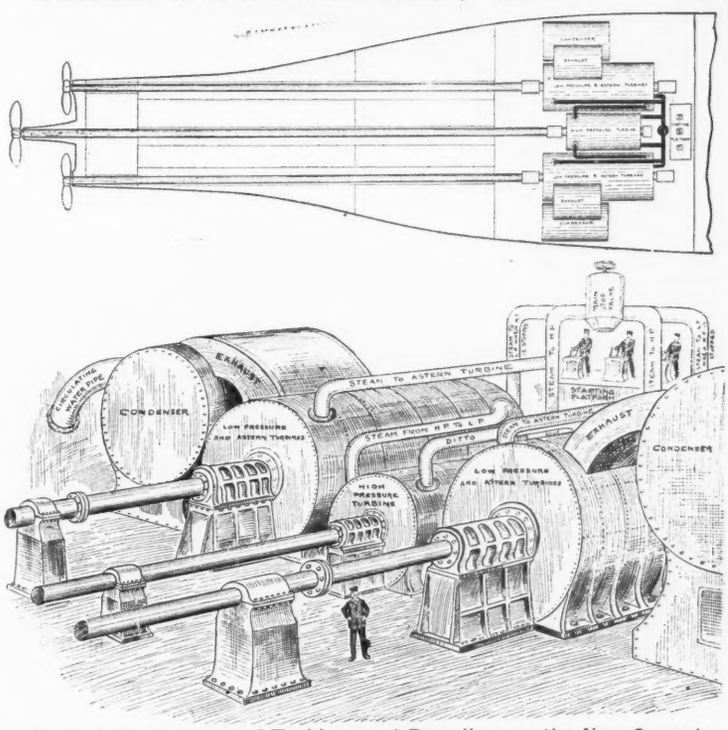
The accompanying illustrations show the general arrangements of the engines and propellers of the new Cunard triple screw turbine steamship "Carmania," built by Messrs. John Brown & Company, Ltd., Clydebank. Aside from her engines the "Carmania" is similar to her sister ship the "Caronia," which was illustrated and described in the *Railroad Gazette*, March 10, 1905.



Cross-Section of the New Cunard Steamship "Carmania."



Stern of the New Cunard Steamship "Carmania," Showing the Powerful Rudder and Two of Her Three Propellers.



General Arrangement of Turbines and Propellers on the New Cunard Triple-Screw Steamship "Carmania."

She is the third merchant ship in the transatlantic trade driven by triple screws, the Allan liners "Virginian" and "Victorian" having preceded her, and is the largest turbine steamship in the world and the first turbine merchant steamer to enter a port in the United States. She left Liverpool on her maiden voyage December 2, and arrived in New York after a passage of 7 days, 9 hrs. and 30 min., thus making an average speed of about 16 knots. There are eight continuous decks on the "Carmania," and the distance from the upper boat deck to the keel is 84 ft. Her principle dimensions are: Length over all, 676 ft.; beam, 72 ft. 6 in.; moulded depth, 43 ft. 9 in. When fully loaded the "Carmania" draws 33 ft. of water. Her gross tonnage is 21,000, and her total displacement is 30,000 tons. She carries a crew of 450 officers and men. She is fitted with three independent Parsons turbine engines, which, it is estimated, develop a total of 21,000 h.p. There are 16 steam winches for handling the cargo, and in addition to these there are two electrically operated winches on the boat for handling the life boats. The rudder is amply protected below the water line, as shown in the illustration, and the propellers are arranged as shown—one on each side and one in the middle.

There are 14 principal water-tight compartments separated by heavy bulkheads or partitions of steel running from the keel to the upper deck. Any one or all of the doors in these bulkheads can be automatically and instantly closed in case of accident by turning a lever located on the bridge. During her trial trip the "Carmania" attained a speed of 20¼ knots in four runs over the measured mile and maintained an average speed of 19½ knots on a continuous run of six hours. She was not designed for an ocean greyhound. She is essentially a passenger steamer, although her cargo capacity, like that of the "Caronia," is considerably larger than that of the other Cunarders.

Telephones on the Illinois Central.

This company is making important improvements in its telephone facilities, concerning which an officer writes as follows:

The I. C. has about 2,000 miles of metallic long distance telephone circuit on the telegraph poles along its road between Omaha and Chicago; Chicago and New Orleans (via Memphis, Tenn.; Grenada and Jackson, Miss.); Sioux City and Ft. Dodge; Carbondale and St. Louis, and Grenada and Water Valley, Miss. Copper wire weighing 166 lbs.* to the mile was used in building these circuits, and while it gives good service in zones of from 350 to 400 miles, the copper is too small to provide talking service for greater distances than 400 miles. The railroad company is itself replacing this small wire between Chicago and Fulton, Ky., with copper weighing 435 lbs.† to the mile, and it has contracted with the Cumberland T. & T. Co. for an exclusive metallic circuit consisting of copper, 435 lbs. to the mile, from Fulton, Ky., to New Orleans, via Memphis, Vicksburg and Baton Rouge, the line following the Yazoo & Mississippi Valley road south of Memphis. The railroad company also secures for its own service a metallic circuit of the C., T. & T. Co. of copper weighing 190 lbs. to the mile between Fulton, Ky., and Louisville, Ky.

All of these circuits are to be worked together exclusively for the railroad company, thus providing interchangeable talking facilities between the cities of Chicago, St. Louis, Louisville, Memphis, Jackson, Miss.; Vicksburg, Miss., and New Orleans.

A considerable part of the existing telephone wires owned by the road is used for telegraph service, in addition to the telephone service, by the composite system; but it is not the intention to so use the new large-wire circuits. This combined service is possible, but it is attained by introducing into the line certain features that are objectionable, and which are liable, at times, to interfere slightly with the telephone circuit for very long distance service.

The use of single ordinary telegraph wires for telephone communication in addition to the telegraph service has had considerable trial on the Illinois Central, and in some cases it has proved very satisfactory. Such service is limited to distances of 125 miles for successful work, but hitherto the cost of the apparatus has been such that as a general rule it is more economical to provide separate wires. Some improvement in the compositing apparatus may be made so that the composite scheme on single grounded lines can be worked satisfactorily and economically, and we expect to make a trial of some late improvements which may bring about the desired results.

The Illinois Central has for a year and a half used a large number of telephones between block signal cabins with highly satisfactory results. About 700 miles of the company's most important single track lines are now worked by the block system, between the stations of which the communication is done by telephone.

I need not tell you that the telephone answers important requirements of modern railroading; and it has not been the experience of the Illinois Central that the telephone service has diminished the amount of telegraph business. It is not expected that it will do so. The telephone is an added facility that is found very useful, and the expenditures for it are deemed wise.

November Decisions in Railroad Law.

The following abstracts cover decisions in railroad law cases made during November by the United States courts:

Methods of train despatcher approved.—The movement of extra freight trains by telegraphic orders based on information relative to the location of trains furnished by local operators or station agents to the train despatcher is a rational, careful and approved method of operating a railroad. The train despatcher is justified in relying on such information and a railroad company will not be liable for injuries to a member of a train crew for a collision occasioned by reason of orders to meeting trains issued on false information furnished by the local operator. In such a case the proximate or immediate cause of the collision will be held that of the recreant local operator who is a fellow servant of the train crew. Northern Pacific Railway Co. v. Dixon, 139 Fed. Rep. 737.

Injury to passenger alighting from moving train.—The fact that the porter of a train announces a station as "the last stop—all out" and opens the vestibule door of the car does not amount to an assurance that the train had stopped or an invitation to the passengers to alight before the car had stopped so as to support an action for injuries received in alighting from the train before coming to a stop. The words were at most an announcement that the train was near the station and would presently stop and the act of opening the door was to facilitate egress when the train had stopped. Mearns v. Central Railroad of New Jersey, 139 Fed. Rep. 543.

Removal of causes to the Federal Court.—A personal injury action has had a novel termination in Alabama. Three railroads were sued for injuries caused by the explosion of dynamite claimed to have been negligently stored in the warehouse belonging to such companies. The plaintiff commenced his action in a court previously created by a state statute. The railroad companies took the proper steps and had the case removed to the Federal Court, where it remained until the statute of limitations ran against the action. Afterwards the Supreme Court of the state held the law creating the new court invalid. The Federal Court, through Judge Jones, has now decided that the action, because instituted in a court having no existence, was never legally commenced and hence there was no "suit pending" in the state court within the Federal statute authorizing removal of causes to the Federal Court and dismissed the proceeding. The statute of limitations of Alabama having run against the action the injured person is left without a remedy. Crowly v. Southern Railway Co., 139 Fed. Rep. 851.

Presumption of care by person killed at a crossing.—In the case of persons killed at crossings the courts generally indulge a presumption of due care by the deceased to avoid the accident. This presumption is by no means conclusive and will not avail the representatives of the deceased in an action for his death when it is clear that the exercise of due care by such person would have prevented the catastrophe. There was such a case where the person killed at the crossing lived in the vicinity and was acquainted with the surroundings and notwithstanding this fact and the further fact that the train was visible for a long distance from the crossing and was approaching with headlight lighted, yet he drove onto the crossing with side curtains of his buggy down and met his death. The physical facts clearly rebutted any presumption that he exercised due care and were of such a character as to preclude any recovery against the railroad company for his death. Rollins v. Chicago, Milwaukee & St. Paul Ry. Co., 139 Fed. Rep. 639.

Assumption of risk.—Although it is the duty of a railroad company to use reasonable care to provide reasonably safe appliances for their servants to work with and keep them free from defects, yet an employee accepting employment with appliances known by him to be unsafe will be held to have assumed the risk of injury therefrom. Where he makes known the dangerous condition and repairs are promised he may then continue his employment for a reasonable time without assuming the risk. Cincinnati, New Orleans & Texas Pacific Ry. Co. v. Robinson, 139 Fed. Rep. 519.

State interference with Federal Receivers.—Judge Grosscup in a case in which a Federal receiver who had been ordered to tear up a non-productive railroad, was interfered with by officers of a state court acting under an injunction writ which forbade the tearing up of the tracks, has held the officers in contempt and punished them. He decides that the institution of the proceedings in the state court was not open to objection but that the Federal Court having possession of the road through its receiver had a right to enter such orders as it deemed within its power and to execute such orders without physical interference by others, including the officers of the state court. Under this decision the state court had a right to determine to what extent it had jurisdiction and the power to relieve parties seeking the injunctions short of physical interference with the possession of Federal Court. Royal Trust Company v. Washburn, Bayfield & Iron River Railroad Co., 139 Fed. Rep. 865.

Injuries to Passengers.*

Injuries to passengers for which employees are at fault, and which could and should be avoided, result from collisions, derailments, improper handling and management of trains and stations, and I will, by way of illustration, cite to you a few cases which have occurred and tell you how, in my opinion, they might have been avoided.

We will first take those caused by collisions:

At Forest Station, April 2, in which 3 passengers were killed and 26 were injured, caused by train No. 112, upon which they were riding, being run into by engine No. 405, hauling train No. 2, Engineman Jackson, at 4 p. m.

In a dense fog and on a part of the division and at a time when trains were thick, with a knowledge that he had followed No. 112 all the way from Thornton, the engineman was so careless as to run by two automatic signals set at danger, a flagman, and into No. 112, and three lives go out and 20 odd are injured. Could anything be more reckless? Do any of you want to ride behind that kind of runner or be on a train in front of him, even if you have your life insured and your home paid for? Will we not all agree that such a man is unsafe and unfit for the service? And in view of the dense fog and the number of trains moving,

*Diameter of wire weighing 166 lbs. per mile.

†Diameter of wire weighing 435 lbs. per mile.

*From a paper prepared by the Claim Department of the A., B. & C. Railroad, to call attention of the officers and employees of the operating department to the causes of many accidents, and show how they could be prevented.

should not trains have been blocked a station apart? It is an absolute protection against accident, which the time interval is not. And when you enginemen see a signal against you, think of the wrecks you have known of since you entered the service, and stop; take no chances. If you can't see the signal, slow down to such a speed that you can stop within the range of your vision. In case of doubt always take the safe course. If you know of any man with defective vision and so little regard for the lives of others as to try to remain in the service with that defect you owe it as a duty to yourself, to your family, the passengers, and other employees, as well as to the company, to report him to the proper officer before and not after an accident occurs. Some day there will be a law requiring the frequent examination of the vision of trainmen, but until that time comes we should all do the best we can to guard against such men.

Next we come to accidents caused by making a switch of cars containing passengers without the engine being attached to the car:

Thomas H. Norton, injured Oct. 20, 1904, in State St. yards; caused by the Pullman car Winona, in which he was traveling, being kicked down against a coach standing at the other end of track, by switch engine 731; the drawbar was gone from the north end of this car and when switch crew tried to stop the car they claim they could not do so with hand brakes, although in good condition.

Everyone knows that it is unsafe to handle a car containing passengers without the engine being coupled to it and air-brake in use, and that rule 181 expressly requires it, and yet in this case it was not done by men long in the service, who probably had done the same thing before without accident and without being caught, and chanced it once too often, and the cost in this case would pay many times over for the time they had saved before. And it is just as unsafe to switch caboose cars in which train crews are resting and cars loaded with horses and cattle or emigrant movables in that way, and it ought to be stopped. If it is, there won't be the injuries to trainmen or damages to live stock that we have now.

We have no end of trouble with circuses and theatrical troupes traveling in their own cars, many of which ought to be in the scrap heap. These cars should never be accepted by us, no matter who is in them or what notice you may have received about the runs to be made with them, unless the brakes, running gear, and everything connected with them are in good repair, but when we do take them, handle them as carefully as if they contained dynamite, and get them off the line without accident. And when you find such a car on a track which you are obliged to use—they should when possible be set on a track not used for switching—either to move it or some other car, handle it with the greatest care; don't do as was done at Harrison just a short time ago when

Laura Jameson, with a theatrical troupe, was in car "Pomfret," Nov. 9th, which was coupled onto by engine No. 402 with such force that she was thrown from the chair in which she was sitting, bruising and injuring her.

Neither would any of the following cases, caused by careless handling, have happened:

Mrs. R. A. Storrs, passenger injured at Whiteford, Aug. 8th, at 7:20 a. m. Engine was pulling train back in the yard and ran in on track that had some cars on it and collided with them, the switch having been left open.

W. R. Thomas, Winton, Iowa, injured at Winton, at 2:50 p. m., Dec. 10, 1903, by reason of standing up near stove in way car and when two cars were coupled on train he was thrown against stove and onto floor.

John A. Klohs, stockman, was riding in the caboose of extra stock train east, conductor, G. H. Tanner, at Yale, June 4th; got up to take off his coat; the train was coupled up with so much force that he was thrown over the stove and his ankle injured.

Now we will take up cases caused by careless loading and unloading of freight from mixed trains:

It would not seem necessary to have to tell anyone that timbers or telegraph poles ought not to be unloaded from moving trains carrying passengers, or from any moving train, and yet that is exactly what was done, when

John A. Owen, W. A. Stead, Martin Kjoelseth, Andrew Thorsen, and C. G. Strombeck, passengers on train No. 82, were injured at Wallace, Aug. 2, by reason of the caboose in which they were riding colliding with some cars on the side track, caused by Anderson, a telegraph lineman, unloading some poles from a car in the train upon which they were riding while it was moving, one of which struck a switch target, opened switch, and caboose ran in on side track and collided with cars.

And when you have a car loaded with logs in your train see that they are secure. If you do, we won't have another accident like the one near Hamlin, January 8th, when

Julius Lewinsky, traveling salesman, passenger on train No. 641, was injured while riding in coach; chain on one of the cars gave away, and logs fell off and were forced through bottom of the coach, striking his left leg.

It would seem to be a simple matter to see that logs, water pipes, machinery, or other property liable to fall from cars are properly secured before car is taken in the train, and so avoid such accidents. Why not do it?

When in a terrible rain-storm you are running over a track which is being repaired, with a slow order, don't do it at a speed of 50 or 60 miles an hour, if you value your life and the lives of those in the cars behind you. If you don't value them, don't do it because it is dangerous and your orders tell you not to, and because your family will suffer if you get killed in the attempt and the company's property will be damaged, and don't, under such, or any other, circumstances, run by a station five minutes ahead of time contrary to Rule 84; and yet that is just what was done on the night of July 2, 1904, when

James Williams, engineman; Charles Jones, fireman; and two tramps were killed; and F. C. Stodmeister, brakeman; W. W. McAllister, baggageman; C. W. H. Brown, Charles Brown, and A. Parsons, porters; W. J. Smith, telegraph operator; Mrs. Miller, Alice Eager, and Mrs. David, passengers, and Thomas King, a tramp, were injured, 1½ miles west of Janeway by train No. 8 running off derail and knocking down the tower.

When you get a bulletin prohibiting running down certain hills or around curves faster than 30 miles an hour, don't do it at 40 or 50 miles an hour, as it is unsafe, and yet that is exactly what was done May 12 near Wilkes, and resulted in the derailment of freight train No. 18, and

William Little, brakeman, was killed, M. J. McWheeney, Geo. Ornoson, Jr., O. A. Dalseth, C. F. Shoelkopf, Geo. V. Hickock, and C. W. Doner, passengers, injured.

A bulletin was issued by Superintendent Davis Nov. 29, 1903, prohibiting trains going down this hill faster than 30 miles an hour. From the statements of the train crew it would appear that no attention had been paid to this bulletin, and, from what the passengers say, it has been customary for a long time for trains coming into Wilkes from Notman and Guilford, if in sight of each other, to make a race to see which train could get there first, so as to get out of Wilkes for Joppa without delay.

Now, there was no excuse for the engineman and conductor not complying with the order. They both got off without injury, as the parties to blame for such accidents generally do. Neither was there any excuse for the train despatcher not knowing that the order was being disregarded daily, as the train sheets would tell him that, and he should have stopped it. To my mind, he was just as guilty as the engineman and conductor, and should have received the same punishment. And when disregard of such orders and bulletins are not winked at, until an accident happens, there will be fewer cases of failure to observe them.

Don't try to run around curves 50 or 60 miles an hour, as a train I was riding on a few weeks ago did and went in the ditch; neither should freight or passenger trains run over interlocking switches faster than 15 and 20 miles an hour, respectively, because it is not safe to do so, and Rule 104 says you must not. Conductors, who are in supreme command on the train, should pull the air on any engineman who is running too fast around curves, over bad places, or through stations, and when you get in, report the matter to your Superintendent, as reckless running should not and will not be tolerated.

Next we have the accidents resulting from occasional derailments, which were not serious, but might have been, and it is the cause, as well as the result, we want to eliminate, such as:

Mrs. K. Smith and four other passengers, train No. 6, which was derailed at Heilprin, Sept. 3. The train was very crowded and these women were standing up at the time of the accident and were injured.

Mrs. Jessie Doan and five other passengers, injured Oct. 11, caused by train No. 15 being derailed one-half mile east of Morse station. From report made by Mr. Reynolds it would seem that this derailment was probably caused by reason of a brakeshoe on the tank of the engine coming off; this brakeshoe had an old defect.

J. E. Fitzsimmons, passenger, injured near Hedley, by derailment of train No. 316, on which he was riding.

None of which would have happened if some one had not failed to perform his duty, and when every accident, no matter how slight, is investigated by an expert—who reports not to the officer who may be primarily at fault, but to the General Manager—to ascertain the actual cause and find a remedy, our troubles will be largely eliminated.

The same is true of injuries like the following, resulting from trains breaking in two:

R. B. Janeway, passenger, and J. P. Mitchell, baggageman, injured Jan. 9th near Gray. Train No. 280 broke in two and rear end ran into head end, and these men were injured.

George Burgan and W. L. Smith and two other stockmen, passengers on train No. 83, injured at Newport, Neb., Nov. 21st; train broke in two, and when the two parts came together these men, who were sitting on the locker in way car, were knocked down.

Another class of accidents which are of altogether too frequent occurrence are injuries caused by trains not stopping long enough for passengers to alight.

Frequently the persons injured are old people not accustomed to traveling, who are necessarily slow in their movements, and

of whom we should take greater care. Think how you or I would feel if our mother or grandmother, if we were fortunate enough to have them with us still, were injured on the Lehigh or Pennsylvania just because the conductor or brakeman didn't have forethought or decency enough to give them time to get off. If you will do that, I won't have a procession of such cases as the following coming into my office, and the company will be so much ahead, as I never could resist the appeal of an old lady, or a young one either:

Mrs. A. J. Denman, passenger from Norwood to Avon, injured at Garwin, Sept. 7th; caused by the train not stopping long enough for her to alight at station platform.

Mrs. C. E. Collinwood and C. Collinwood, passengers on train No. 32, from Omaha, injured at Hamburg, Oct. 17th; caused by train starting before they had an opportunity to get off. They were alighting on the side away from the station; claimed that station was not properly announced. A number of people were compelled to get off this train after it had started.

P. J. Wilkins, passenger, injured at Johnsport, at 1:10 a. m., Oct. 31, getting off train No. 35, while in an intoxicated condition; brakeman gave signal for train to start as the man was coming down the steps, thinking as he claims, that the man would have gotten off before train started; both the brakeman and the conductor of train knew that the man was intoxicated.

Sarapino Guiseppi, injured at Engletown, Sept. 26, at 6:15 p.m. When train stopped at Engletown a number of passengers crowded onto it and, before this man had an opportunity to get off, the train started, and, while alighting, he fell and was run over and lost his left arm. The conductor was in the combination car, one of the brakemen had gone to the station with way-bills, and the other brakeman was at the end of the car from that at which this man got off.

It seems to me that if the instructions contained in Rule No. 38, requiring the announcing of stations by brakemen, were complied with and thereby passengers given ample notice of the approach of the train to their destination, they would be prepared to get off, instead of in the present method, or, rather, lack of method, as the rule is so seldom observed as to cause comment when it is complied with, and if, before giving the signal to start the train, trainmen would get upon the car platform and look into the cars to see that there was no one else to get off, especially should this be done at night when passengers are tired and sleepy, when platform lights are not any too numerous, and with excursionists, and picnickers who are often none too sober and who are not accustomed to moving quickly, and if at division terminals trainmen would pay more attention to assisting passengers off instead of being in such a hurry to cut off a car, getting their markers, or getting away from the train, not only would such accidents as those last enumerated be avoided, but the journey would be made much more comfortable, as well as safe to passengers; and that the road doing this would increase its traffic. We deadheads, who mostly ride in Pullmans or private cars, do not realize how annoying and exasperating to paying passengers is the present method of trainmen, going into the cars and pretending to call stations in some dead language, or by talking to themselves. In transferring passengers from express to local trains you must bear in mind that the passenger is frequently unaccustomed to the surroundings, is generally over-anxious about getting off so as not to miss connections, and coming from a lighted car out into the darkness, in his hurry and excitement may not notice that the train is running; in these cases the train is always moving so smoothly the passenger thinks (or says he does) that it has stopped, and off he goes, and it is necessary, to prevent such accidents occurring, to exercise the greatest care, and by proper announcement make it plain to all such passengers that ample time will be given them to alight, and that their train cannot pull out until after your train does.

And when you are receiving passengers, especially on mixed or freight trains, don't start until they have a chance to get seated, and then such cases as the following won't occur:

Mrs. A. L. Bishop, passenger on freight train 91 from Milton to Jessop, had gotten into caboose, but had not time to get seated before train started with a jerk; she was thrown down and injured.

Mrs. Mary Hanson, passenger from Grant to Portsmouth, on train 15, June 4th, 1:15 p. m. Before she had time to get to her seat, train started, and she was thrown down and injured.

When you are making your station stop, don't jerk your train, after it has stopped, or is about to stop, and while the passengers are getting off, as they surely will commence to do so as soon as (if not before) the train is stopped. Don't pull up or back up a few feet to get to the standpipe or coal chute, because if you do, some one is liable to get hurt, as the following did:

Dr. H. Q. Johnson, passenger, injured at Dale, Sept. 6; train No. 603, engine 421, Engineman Wm. White, stopped at station platform and then started to move ahead again. Dr. Johnson stepped from platform onto steps of coach and, as he did so, brakes were set to emergency and train stopped suddenly; he was thrown against the edge of vestibule.

Helen Kennedy, a child 2½ years old, with its parents, was on train No. 73, bound for Stratford; had gotten up for the purpose of getting off at Henderson, March 26. Train stopped and as passengers were on the platform it was backed up without notice, and this child was thrown, and her arm went between the two car platforms, badly bruising and cutting it, just missed taking it off.

And when you are pulling into a station and intend to take water and are going to run by the pipe a few feet, don't use the emergency brake to stop with, because, if you do, some one is liable to get hurt. Nearly every one has been on a train when this has been done contrary to Rules 436 and 438, and if you enginemen could hear some of the complimentary remarks that are made about you and the company on such occasions, you would want to resign. And when it is raining to beat the band, stop your trains so that the passengers can get off opposite the station building and avoid getting wet, do not pull them by a couple of hundred feet just because the locomotive is thirsty. Pull up to the tank after the passengers get on and off, so says Rule 341, and the women, and men, too, for that matter, will think you are a dandy and vote for you the next time you run for school trustee; and perhaps, by so doing, you may prevent your best girl spoiling her dress.

And when you are running an engine you want to know that its grease cups are screwed on tight and that its brake-shoes are not cracked, if you do not want to have cases like the following:

Fred. C. Mitchell, while waiting for a train on station platform at Lucian, Feb. 1st, was struck and fatally injured by a grease-cup plug from engine No. 206, passing the station, hauling train No. 82. Feb. 2d this same engine, on its way to Louisville, lost a similar plug, but fortunately, it did not hit anyone when it came off.

Chas. C. Wilson, standing on the platform at Newton, June 30th, to take passage on a train; brakeshoe on engine No. 716, hauling train No. 52, running through the station at 60 or 65 miles an hour, broke, and part of it struck Mr. Wilcox on the foot, injuring him.

One of the rules most frequently disregarded is No. 232, prohibiting a train on the double track pulling through a station while another one is standing there unloading passengers.

About nine times out of ten you can do it without an accident, but the tenth time some one will get hurt and you will get a vacation of from 30 days to life. I know it is tantalizing, when you are pulling a fast train and are, perhaps, a little late, to be compelled to stop and wait until the other train has pulled out, and its last car passed the end of the platform nearest you, when you could sneak through the station and save a little time, and perhaps no harm be done and no one be the wiser; but don't do it, because the rule says you must not.

If that part of the rule which says, "When two trains are nearing a station from opposite directions at the same time, and only one of them is scheduled to stop, the train making the stop must reduce speed and let the other through the station before it arrives" was complied with, the trouble would be largely overcome.

You men who are running stations should see that your platform lamps are not only kept clean and properly filled, but that after dark they are burning so that passengers won't get hurt falling off platforms in the dark, and that the platforms are kept clear of freight as per Rule 645; that baggage and express trucks are placed where patrons won't fall over them, and, if there is a fast train coming, especially a mail or newspaper train, notify the passengers and get them inside the depot, the only safe place at such times. Especially is this necessary on the double track. If there is a broken plank or a hole in the station platform, nail a board over it until the carpenters can get around to fix it. See that the platforms are kept clear of snow and ice; but when there is ice on the platform, throw ashes or sand over the ice so that people won't slip on it. And if you have people waiting for trains at your station, especially in the night time, see that the fire in the stove in the waiting room is kept going so that they will be comfortable and not catch cold. It will take you less time to do these things than it will to make a report of an injury, and then cases like these won't be put up to me to guess at:

Mrs. J. P. Gedney, injured at Ontario, June 24, 10:27 p. m., was at station to take passage on train No. 17, went out of a lighted waiting-room onto a dark platform and fell and was injured.

Mrs. Mollis Schmella and Dr. Cleveland, injured, passengers on train 31, arrived at Altruria 8:30 p. m., Saturday, Aug. 21st; raining; got off train, no lights on platform; doors of depot locked, and fell from platform to track.

M. O. Hudson, passenger from Elton to Woodbridge, on train No. 47, arriving at latter place Aug. 28th, at 12:30 a. m., got off coach and ran up to baggage car to get baggage; in doing so ran against train signal on platform, was thrown down and injured; no lights on platform or in signal.

S. W. Thomas, passenger on train No. 48, injured at Harkrader, Oct. 21st, at 11:20 p. m., was getting off chair car, which stood 150 ft. south of the platform; there were no lights, and the porter had no lantern, and when he stepped from the car step to the porter's box he slipped and fell.

And sweep the car platforms, so passengers won't slip on banana peels, and then such cases as the following won't happen:

H. T. Witheridge, injured at Wingate, Aug. 4, 1903; caused by his slipping on a banana peeling left on the platform of a coach in train No. 176 by the car cleaners.

When passengers are carried on freight trains Rule 241 says the car in which they are riding must stop at the platform to unload them. Don't do it out in the yard, and, if you have to do

switching after unloading the passengers, stop at the station platform as you are pulling out and give the passengers a chance to get on and not compel them to go into the yard in order to do so. If at night, they might fall into a culvert or over some obstruction alongside the track and get hurt, and, if the platform at the station is short, arrange your work so as to make one stop where the passengers can get off safely, and notify them, so they will know when they can do so; and be sure to assist them in getting on and off, especially the old men and women, the children, and the cripples (that is what Rule 801 says, and you always do it for the young and pretty girls) and then I won't be trying to conjure up excuses for cases like the following, or pay for them either:

Miss Belle Saunders, injured at Milwood, Dec. 14, 1903, was a passenger on train No. 16 from Homer to Milwood. This is a mixed train. It was stopped some distance from the passenger station; the passengers were allowed to alight, and in getting from the track to the street going down the embankment she fell and sprained her left ankle. It has been the custom to stop this train at this point for some time and allow the passengers to get off there, the busses coming up as near as they could to take them to the hotel.

Mrs. A. Zuehlke, injured at Granby, Oct. 10th, at 6:10 p. m., in getting off a train on which she had been riding as a passenger; the station platform is so short that only the platform of one car in trains can be stopped at it, and when the car happens to stand in a special position, owing to the manner in which the platform is constructed, the space between the car and the station platform is about 3½ ft.

Mrs. Mary H. Crawford, passenger, injured at Beulah, Oct. 13th, getting off train No. 35; porter allowed her to fall, and she stepped between platform and car steps, injuring her left thigh.

Another cause of injury to passengers, especially children, who always want the windows open, is by the windows falling and injuring them. Nearly always their little hands or fingers get hurt; or by ventilators falling on their heads. When you have an accident caused by a window falling examine it immediately and, if the catches are all right, show the injured person or, if a child, the man or woman in whose charge it is traveling that it was not the fault of the window catch, and at the same time call the attention of some intelligent passenger and of your brakeman to the matter and have them try the window catch, and send in their names and addresses with your report. If, however, the catch is defective report the fact, but don't advertise it, and whenever you find any defective catches or anything else wrong about a car in your train call the attention of the first car repairer you meet to the matter and have it repaired, and, at the same time, report it to your Assistant Superintendent. If the car repairers would make an examination of the windows, their catches, and of the ventilators, for the purpose of finding out their actual condition, we would get rid of many such cases. Do the same thing with the matting in the aisles, and when there is a hole in it get it fixed, or get a new one. If you can't do that, take the matting up and so prevent anyone falling on it.

And, speaking of aisles, so far as possible get passengers to keep their valises, suit cases, and bundles out of the aisles so that other passengers won't fall over them. If the glass in a door gets broken, when the train is running, be sure that all the glass is taken out of the frame, so that passengers won't catch their hands on it. Take pains to see that your passengers, especially the old and infirm, the woman, and children, are provided with seats, and when some passenger, whether man or woman, who has paid for only one seat or is riding on a pass, is occupying three or four seats have them make room for those standing. Pay some attention to ventilation—in cold weather open the ventilators on the side the smoke trails on, and then there won't be any draught. In other words comply with Rule 573 and then cases like the following, which seem to be on the increase, won't happen:

Nora Holm, 3 years of age, injured near Henshaw, July 24th; caused by a window in coach 338, train 9, falling on her arm, on account of a defective spring.

Charles A. Paner, passenger, injured July 17th, between Henley and Chester, window catch in coach 4378 was broken off; he raised the window and put a comb under it to hold it up, and window came down on his arm.

H. Wicker, boy, passenger, injured at Butterfield, Aug. 25th, on train No. 19, at 3:55 p. m., had his head out of window in coach No. 818; screws were out of clasp and the window fell on his head.

The Allis-Chalmers Steam Turbine.

The first turbine to be put in operation by the Allis-Chalmers Company, Milwaukee, Wis., which lately entered the steam turbine field, was recently started up at the Washington street power house of the Utica Gas & Electric Company, Utica, N. Y. The unit is shown in Fig. 1. The turbine is rated at 1,500 k. w., normal load, running 1,800 r. p. m. It is direct coupled to an Allis-Chalmers two-phase, 60-cycle, revolving field alternator, operating at 2,500 volts. The unit has a continuous overload capacity of 25 per cent., with a three-hour 50 per cent. overload capacity without exceeding a safe generator temperature, and capable of 100 per cent. safe momentary overload. Artificial ventilation by means of an electrically-driven fan blower will, however, enable the unit to be run safely beyond its rated overload capacity.

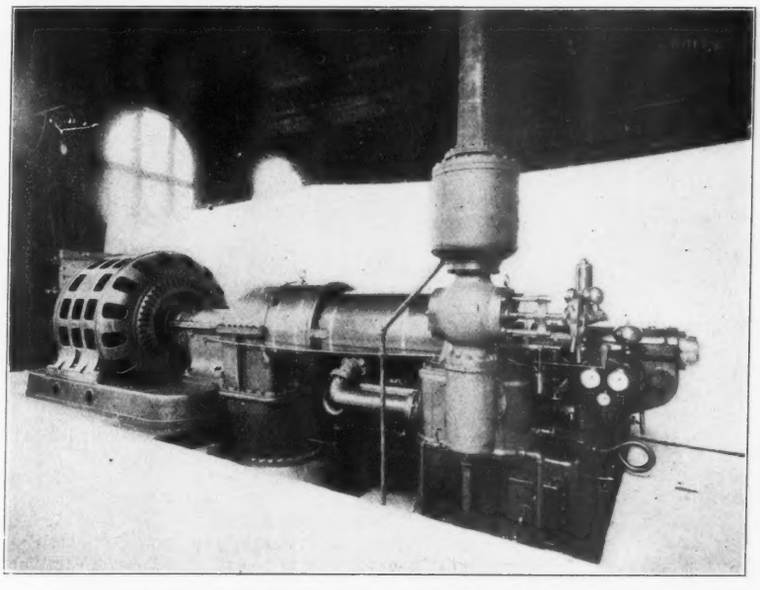


Fig. 1—The Allis-Chalmers 1,500 Kw. Turbine Unit.

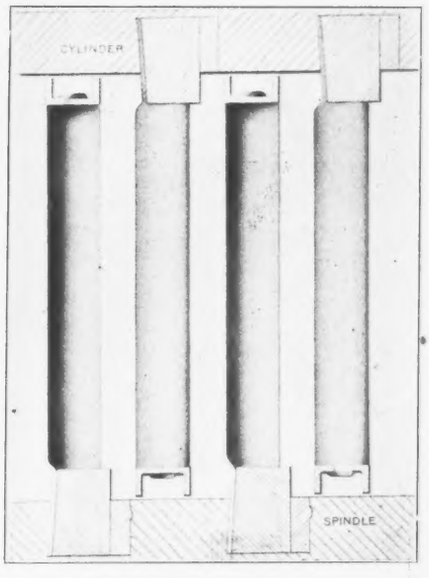


Fig. 2—Blading Scheme.

The turbine follows the well-known Parsons type, which has proven itself eminently successful in numerous installations both here and abroad. The Allis-Chalmers construction, however, embodies a number of features which are new in this country, and which are claimed by the builders to be distinct improvements. The chief distinguishing feature of this construction is the blading, which, while it is of the Parsons reaction type as regards the principle of operation, differs in mechanical construction in a number of essential details. The roots of the blades are formed in dovetail shape by special machinery, and are inserted in slots cut in foundation or base rings; these slots being formed by special machine tools in such a way as to conform exactly to the shapes of the blade roots. The foundation rings are of dovetail shape in cross section and are inserted in dovetailed grooves cut in the turbine cylinder and spindle respectively, in which they are firmly held by key pieces, much in the same way that the well known "Lewis bolt" is fastened. In order further to insure the integrity of the construction, the key pieces or rings after being driven into place are upset into undercut grooves.

Another noticeable feature of the blading is the method of reinforcing and protecting the tips of the blades. This point in steam turbine design is one upon which much thought has been expended by inventors; it is claimed that the design under consideration successfully solves all difficulties. In forming the blades a shouldered projection is left at the tip. This is inserted in a slot punched in a shroud ring; the slots being punched by special

machinery in such a way as to produce accurate spacing and at the same time form the slots so that they will give the proper angles to the blades independent of the slots in the base ring. After the blade tips are inserted in the slots in the shroud rings they are riveted over by specially arranged pneumatic machinery. The shroud rings are made in channel shape, with outwardly projecting flanges which, after assembly in the turbine, are turned and bored to give the necessary working clearance. The flanges of the channels are made so thin that, although amply sufficient for stiffness, the shroud ring does not have the disadvantage of a solid shroud which acquires a dangerous temperature by friction in case of an accidental contact of the rotating and stationary parts. It is claimed for this construction that the blades are stiffened against the effect of vibration in a much more substantial manner than by any other means thus far employed, while the use of a protecting shroud ring enables the working clearance to be made smaller than in the case of naked blade tips, without danger in case of accidental contact, thus reducing the leakage loss to a minimum; the leakage past the blade tips being the principal source of loss in the steam turbine. As to the safety from damage in case of accidental contact, it is claimed that this has been proven by experiment with actual blading, by throwing the bearings out of center so as to produce contact, without detrimental results. An incidental advantage claimed for this construction is that if by chance a blade should prove defective, it is so held in place by the shroud ring that it cannot possibly work loose and produce damage.

By the method of construction described, the entire blading is produced by machinery, thus eliminating the personal equation which enters into blading done by hand work, which depends upon the skill of the individual workmen. Besides insuring that every blade is securely fastened, all blades are necessarily set at exactly

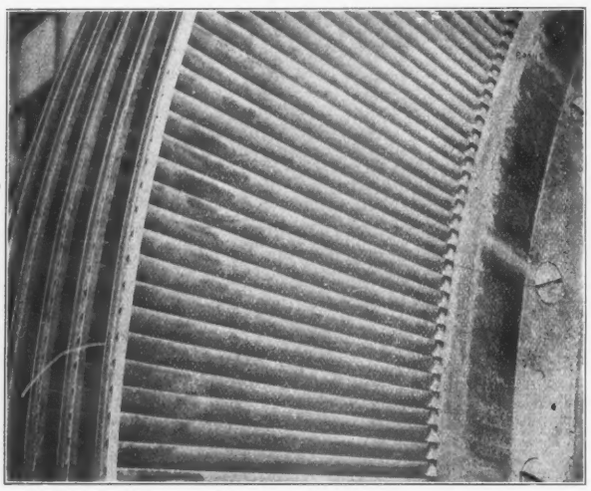


Fig. 3—Detail View of Blading.

the designed angle and pitch; the openings between blades, upon which in great part the economical performance depends, being absolutely uniform. The blading is made up in half rings in the blading shop and is carefully inspected before being inserted in the turbine.

Fig. 2 shows the general scheme of the blading, illustrating the method of fastening the blades as well as the channel-shaped shroud ring. Fig. 3 illustrates the blading, and shows its substantial construction as well as the uniformity of the work. Fig. 4 shows a turbine spindle of the same size as that of the Utica turbine. A feature noticeable in Fig. 4 is the absence of the usual low-pressure "balance piston;" the photograph showing only two balance pistons instead of the three pistons formerly used in this type of turbine, where it is said to have been found difficult to produce a balance piston of the size required for balancing the low-pressure stage of the turbine and at the same time make it sufficiently rigid to run with the necessary small working clearance. In the Allis-Chalmers construction there is, however, a third balance piston, but instead of being at the high-pressure end of the turbine, as formerly arranged, it is at the low-pressure end, and as it is smaller than the large end of the spindle it is hidden from sight in the photograph. By making this piston in such a way that its circular area is equal to the annular area of the pistons used in the older construction, the low-pressure balance piston is made much smaller Instead of reducing the leakage past this piston by means of "dummy packing," as in the high-pressure and intermediate pistons, and as used in the low-pressure pistons of the older construction, a labyrinth packing of radial baffling type has been adopted, thus eliminating small axial clearance in this turbine. A considerable advantage is claimed for this construction in permitting the use of smaller workng clearances in the high-pressure and intermediate balance pistons. Other points of improvement claimed for this construction include details of spindle construction, governing mechanism, lubrication, and other minor features.

The alternating current generator of the Utica outfit deserves notice. Perhaps the most noticeable feature of this generator is the substantial design of the revolving field, providing great strength and at the same time giving the thorough ventilation which is essential. Particular attention has been paid to the insulation, evidenced by the fact that the armature (Fig. 5) was subjected to an alternating current insulation test of 10,000 volts for a period of 15 minutes. This generator was built at the Bullock works of the Allis-Chalmers Company, at Cincinnati, Ohio, where the generators for all of their other turbine outfits are being built.

The Allis-Chalmers Company, in entering the steam turbine field, effected an alliance with the Turbine Advisory Syndicate of England, thereby securing the co-operation of the firms therein interested, including Messrs. Millans & Robinson, the high-speed engine builders, of Rugby; Yarrow & Company, the well-known torpedo boat builders, Isle of Dogs, London; and the Neptune Shipbuilding Works, Walker-on-Tyne. The Utica turbine was built for

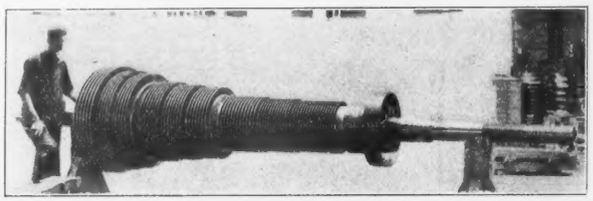


Fig. 4—Turbine Spindle.

the Allis-Chalmers Company by Messrs. Williams & Robinson, to whom a number of turbine contracts were sub-let by the Allis-Chalmers Company before the latter had perfected the installation of their special machinery for turbine manufacture. An agreement has more recently been effected with Hon. Charles A. Parsons, C. B., for interchange of data, thereby giving to the Allis-Chalmers Company the benefit of the vast experience of Mr. Parsons, the original inventor of this type of turbine, and to whose engineering ability and indomitable energy the evolution and present state of perfection of the successful steam turbine are principally due. The Allis-Chalmers Company has also secured rights under Mr. Parsons' patents for marine turbines and turbo-compressors and blowers, for which there is a growing demand.

The Allis-Chalmers Company is now building steam turbines in its engine works at West Allis (Milwaukee). The growth of the business has led to a large extension of the works, amounting to a practical doubling of the present plant. A considerable part of the extension will be devoted to the manufacture of steam turbines and the accompanying electric generators; one of the three new manufacturing buildings being given up to the exclusive manufacture of the turbines themselves. The first steam turbine of

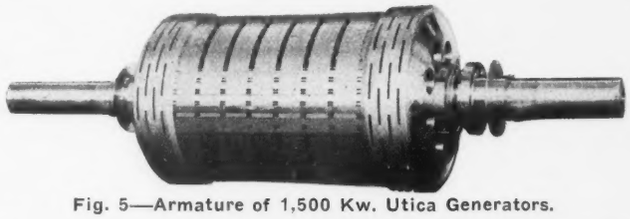


Fig. 5—Armature of 1,500 Kw. Utica Generators.

the Allis-Chalmers Company's own make, of 5,500 k. w. capacity, nas recently been shipped, and others are following as fast as the present crowded condition of the shops will permit.

Bavaria takes the prize for the most conscientious passenger if we may trust a correspondent of an Augsburg newspaper who relates the following as an actual occurrence. On entering a second-class compartment of a train going to Munich, the correspondent found there an elderly gentleman and his son. He entered into conversation with the father, who listened attentively but soon seemed much distracted and consulted his watch frequently. Finally, when within a few miles of Munich, he jumped up and pulled the cord which sets the emergency brake in German cars. As the train came to a sudden stand the trainmen ran to the compartment and asked anxiously what was the matter. "Nothing is the matter with the train," said the old man, blandly; "but this boy of mine became 10 years of age just now, at half-past nine. As he was not 10 when we started, I got a half-fare ticket for him. For the rest of the way to Munich full fare is due. What's to pay?" The language of the trainmen is not reported, but the paper seems a little scorched just there.

GENERAL NEWS SECTION

NOTES.

The State Railroad Commission of Illinois has directed its secretary to revise the freight rates on the railroads of that state, to go into effect January 1; and on roads in Class A the order makes a horizontal reduction of 20 per cent. Roads in Class B may charge 10 per cent. more than the rates on roads in Class A.

In a local court at El Paso, Tex., the railroads have been declared violators of the Anti-trust Law, and the ticket scalpers, by presenting this argument, have escaped prosecution. As in the case which came up in the Federal Court at Buffalo a year or two since, the railroads which attacked scalpers were charged with maintaining associations for regulating fares and thus in some degree suppressing competition in fares; and the court, necessarily finding this charge valid, under the Sherman Law, had to throw the railroads out of court.

On Tuesday, December 5, the elevated and subway lines of the Interborough Rapid Transit Company, New York City (Boroughs of Manhattan and the Bronx) carried 1,380,000 passengers, the largest number ever carried in a single day. The number on the elevated lines was 865,000 and on the subway lines 515,000. An officer of the Interborough tells a reporter that the population is rapidly increasing in those parts of the city which are convenient to the subway, and that large numbers of business men now go home to lunch in the middle of the day who could not do so before the rapid transit of the subway was available.

The Southern Pacific has modified its decision refusing to take "personally conducted" tourist car parties from its eastern connections. It appears that the chief reason for the original decision was the fact that the rival lines bringing passengers into Ogden from the East have frequently delivered tourist sleeping cars only partially loaded, thus throwing upon the Southern Pacific the burden of many hundreds of miles of unnecessary haul. It is now proposed to consolidate such loads at Ogden. It is said that on Thursday and Friday, November 2 and 3, the Denver & Rio Grande delivered to the Southern Pacific at Ogden 87 tourist cars all "personally conducted." These cars, which are run two days in a week, take more passengers than those, without special conductors, which are run on the other five days in the week.

According to press despatches from Philadelphia, the Pennsylvania Railroad is to make a sweeping abolition of free passes beginning January 1. The classes to be cut off are office holders, politicians, newspapers and everybody, "with the possible exception of the President of the United States." The only reasons given are that the spirit of the Interstate Commerce Law forbids the long established custom, and that the officers of the road deem it fitting to take this action as a result of the agitation against the giving of rebates. Philadelphia reporters who have talked with officers of the Pennsylvania say that the trunk line presidents are to meet this week and that all the other lines will take the same action as the Pennsylvania. The New York Central has already made a similar announcement.

The Attorney-General has sent instructions to every district attorney of the United States to vigorously enforce the laws against discriminations by common carriers. They are to diligently investigate all complaints received from any source, and to make investigations on their own initiative also. Whenever practicable, they must get grand juries to indict both shipper and carrier, and where the testimony of one is needed to convict the other, witnesses should be assured of immunity from prosecution. Where there is sufficient evidence, violators of the law should be indicted for conspiracy to commit an offense against the United States, based upon section 5440 of the revised statutes. The Supreme Court has held, in Clune vs. United States (159 U. S., 590, 595), that a conspiracy to commit a crime, itself punishable only by fine, may be punished by imprisonment; and where a conviction is secured, the court should be asked to punish by imprisonment and not by fine alone. It is announced in Philadelphia that under this order the Federal grand jury will be asked this week to investigate alleged illegal preferential rates on iron pipe sent to Winnipeg, and alleged illegal cartage allowances to a shipper of coffee in Philadelphia.

The Railway Mail Service.

At the close of the year [June 30, 1905] the railway mail service comprised 12,474 officers and employees, an increase in the year of 853. In the amount of ordinary mail handled there was an increase of about 5.77 per cent. as compared with the preceding year, and of 13 per cent. in registered matter. During the year 12 clerks were killed while on duty. The preceding year there were 18 regular clerks, two substitute clerks and one mail weigher killed. The number of clerks seriously injured was 125, as against 90 for last year. The number of clerks slightly injured was 386, as against 348. The arduous and hazardous duties incident to the service emphasize the desirability of some legislative action that will make provision for clerks worn out in the service and maintain the vigor and efficiency of the service by the gradual elimination of superannuated clerks.

On June 30, 1905, there were 3,064 railroad routes, the total length of which was 200,965 miles, with an annual travel of 362,645,731 miles. The expenditure in the United States was $39,833,070. The increase for the year was 4,057 miles in length of routes, 9,607,334 miles in annual travel, and $655,694 in annual rate of expenditure.

The present method of determining the rates of pay for this service is not altogether satisfactory, and while I am not yet prepared to suggest specific changes, it is believed that certain inquiries that are being instituted through departmental channels will afford data on which to base future recommendations. The plan now followed appears to furnish a somewhat uncertain basis upon which to make annual expenditures exceeding $40,000,000.—Postmaster General, Annual Report.

Interlocking on Twenty-three Roads.

The Federal Railway Signal Company, of New York, reports that the contracts received by it during six months ending Oct. 31 last for mechanical interlocking aggregated about 1,000 levers, as follows:

Name of Railroad.	Location.	Machine lever space.
Baltimore & Ohio	Niles, O.	36
Baltimore & Ohio	Wildwood, Pa.	32
Baltimore & Ohio	Ravenna, O.	52
Baltimore & Ohio	Flushing, O.	24
Baltimore & Ohio	Nova, O.	28
Baltimore & Ohio	Kent, O.	24
Baltimore & Ohio	Lowellville, O.	32
Baltimore & Ohio	Kimmel, Ind.	32
Baltimore & Ohio	Ripley, Ind.	24
Chic., Bur. & Quincy and Ill. Central	Christopher, Ill.	20
Chicago Great Western	Redden, Ill.	12
Chicago Great Western	Winston, Ill.	8
Chic. Ter. Trans. and Chic. & Grand Tr.	Glue Island, Ill.	80
Cin., Ham. & Day. and Cin. Northern	Carlisle, O.	28
Delaware & Hudson	Oneonta, N. Y.	24
Delaware & Hudson	Oneonta, N. Y.	36
Delaware & Hudson	Delanson, N. Y.	24
Delaware & Hudson	Mineral Springs, Pa.	28
Delaware & Hudson	Moosic, Pa.	20
Delaware & Hudson	E. Glenville, Junctn, N.Y.	20
Del. & Hud. and Del. Lack. & West.	Minooka, Pa.	20
Gt. Northern and Chic., St. P., M. & O.	Oakland, Neb.	40
Gt. Northern and Chic., St. P., M. & O.	Dakota City, Neb.	16
Indian Harbor & Chic., Ind. & Louisville	St. Johns, Ind.	28
Indian Harbor & Indiana, Ill. & Iowa	Schneider, Ind.	48
Indiana Harbor and Chic. & East. Ill.	Morocco, Ind.	32
Indiana Harbor and C., C., C., & St. L.	Sheff, Ind.	52
Indiana Harbor and Lake Erie & Wes.	Handy, Ind.	48
Louisvle, Henderson & St.L. and Ill. Cen.	West Point, Ky.	16
M., St. P. & S. Ste. Marie and Gt. Nor.	Warren, Minn.	16
M., St. P. & S. Ste. Marie and Gt. Nor.	Conway, N. Dak.	16
M., St. P. & S. Ste. Marie and Gt. Nor.	Ardoch, N. Dak.	20
M., St. P. & S. Ste. M. and Nor Pac.	Forest River, N. Dak.	16
Philadelphia & Reading	West Milton, Pa.	32
Philadelphia & Reading	Harrisburg, Pa.	64
Philadelphia & Reading	Ryberry Road, Pa.	16
Philadelphia & Reading	Bustleton and Somerton Turnpike, Pa.	16
Philadelphia & Reading	Crescentville, Pa.	28
Pennsylvania Lines West of Pittsburg	Urbana, O.	24
Pennsylvania Lines West of Pittsburg	Hagenbaugh, O.	24
Pennsylvania Lines West of Pittsburg	Summit, O.	24
Total		1,180

Rio Janeiro Steamers.

The Lloyd Brazilerio, which operates three lines of coastwise steamships out of Rio de Janeiro, Brazil, is being reorganized. The government will require it to run its own steamers to the United States, and this will necessitate twenty-two additional vessels, and eight smaller boats are required for river navigation. The new steamers are expected by October, 1906, and the new service is intended to be in operation by November 15 of that year.

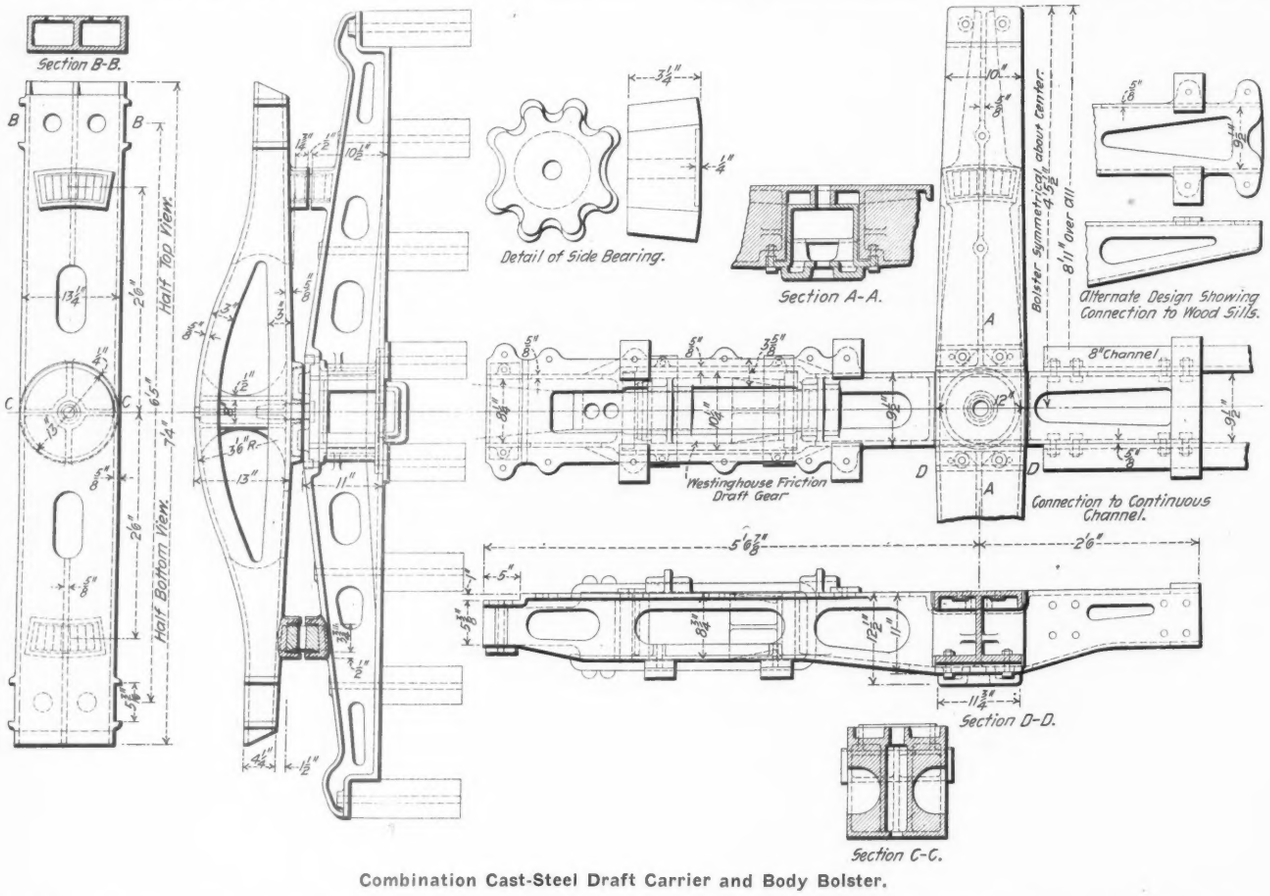
Scare Suggestions.

The railroad interests have abandoned their "information bureau," which was indefatigable in sending undesired information to newspapers in the hope of killing off the sentiment sustaining President Roosevelt in his attitude as to regulating rates. The policy of the railroads in their fight has been puerile, and has planted still deeper in some minds the belief that the opposition was very far from being in the interests of the people. This literary bureau's arguments and scare suggestions were cheap. The attempt to break up meetings of various business interests which were likely to pass resolutions favoring rate regulation was another childish way to be smart. And the appearance of railroad employees urging that the

present laws be not changed was as funny as Punch. The present movement is likely to prove just like the railroad attempt to prevent the adoption of safety-couplers and other life-saving apparatus. That splendid movement in the interests of humanity was declared an impossible and preposterous scheme, yet to-day it is saving life and property, and justifying itself right along. The railroad managers have been more scared than hurt, and apparently have feared anything that curtailed their absolute monopolistic power, the most dangerous thing for themselves, if they only knew it, of all the chances of trouble that their calling develops.—*Hartford Courant.*

Combination Draft Carrier and Body Bolster.

The accompanying drawing shows a new design of cast-steel draft-carrier and body bolster made in two pieces which interlock with each and require no bolts or rivets. The draft-beam casting has a hollow box section and extends from the end sill to a point 26 in. back of the center of the bolster. The part in front of the bolster can be modified to suit any form of draft gear or attachments and does away with wooden sills, draft lugs and bolts or rivets. In the drawing the Westinghouse friction draft gear



Combination Cast-Steel Draft Carrier and Body Bolster.

is shown applied. Back of the bolster the draft-casting can be modified to fit any sill construction, either of wood or metal. For 8-in. channel sills eight bolts are required for the attachment to each sill. Where wooden sills are used the construction shown in the detail in the upper right-hand corner of the drawing is used.

The body bolster is cast in one piece with an I section and broad flat top flange, giving it ample strength in all directions. At the center it bridges the draft casting which is put in from the bottom and interlocks with it both longitudinally and laterally. Four bolts are used for fastening the two pieces together but they are not subjected to any shear. The top center plate instead of being cast on the body bolster is cast on the under side of the draft beam.

The drawing also shows a cast-steel truck bolster and a new form of side bearing. The truck bolster is made in one casting with a box section at the ends and a deep center section, with a supporting strut. The bottom, of the side bearing boxes on both bolsters are corrugated and a cast-steel roller, with corresponding corrugations or teeth is inserted instead of the usual form of smooth roller. This roller is tapered to keep it always in proper alinement and cannot work out of the boxes.

These devices have recently been patented and are to be sold by the Pittsburg Equipment Company, 541 Wood street, Pittsburg, Pa.

South American Railroad Projects.

Guayaquil & Quito Railway.—The construction of the 245-mile railroad between Guayaquil, the principal seaport of Ecuador, and Quito, the capital of the republic, situated in the Andes at an altitude of 9,390 ft. above the sea level, is expected to be completed by the middle of next summer, after which it is proposed to continue the line 8,000 ft. down the side of the mountains to Ibarro on the border of the United States of Colombo, about 50 miles from Quito. The line is already in operation from Guayaquil to Riobamba, a distance of about 100 miles. Riobamba is a city of some 40,000 inhabitants, and is surrounded by a thickly populated and fertile country. The road is, however, built on to Ambato, which has a population of about 25,000, and is the point where trade from the Orient or interior of Ecuador concentrates. The only present entrance from the plateau and populated districts of Ecuador into the watersheds of the Amazon river is down the Palata river from Ambato, and over this route the rubber and other products are brought to the latter place. Ambato is located at an height of 8,554 ft. above the sea and is about 60 miles from Quito.

Although the Government of Ecuador has been trying for the last 50 years to get the line built, no real work was done until 1871. By 1875 about 30 miles of road were completed. Nothing further was done until 1887, when about five miles more were laid. The government caused extensive surveys to be made during the early nineties, but nothing in the way of further construction was accomplished. Meantime a large part of the road already built fell, through neglect, into a ruinous condition. From 1873 to 1894 no less than a dozen formal contracts were made between the government and private firms, both Ecuadorian and foreign, for the construction of a railroad which should connect the coast with the interior plateau, but every effort resulted in failure and financial disaster until 1898, when the government entered into a contract with Archer Harman, of New York, for the rehabilitation of the old railroad and for the construction of the line on to Quito. The Guayaquil & Quito Railway Company was formed with American and British capital in about equal proportions for the purpose of carrying out the enterprise. Mr. Harman is President of the company, and T. H. Powers-Farr is Vice-President. The directorate now includes the names of Erskine Hewitt, E. P. Holran, Charles H. Lee, S. H. Lever, E. Hope Norton, E. Dutilh-Smith, Elliott C. Smith, Robert Meade Smith, Hiram R. Steele and Arthur Turnbull, all of New York, and W. M. Beckner, of Kentucky. The total issue of $12,282,000 first mortgage 6 per cent. gold bonds of the company are secured by a first lien on the customs receipts of Ecuador (which amounted

to about $4,000,000 in 1903), and by a first mortgage on the railroad and its appurtenances; they are also guaranteed as to principal and interest by the government.

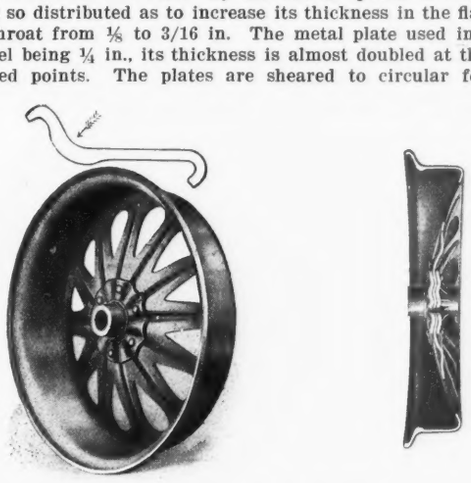
The Ecuadorian Association, Limited, was incorporated in Scotland to carry out the agreements for construction between the Ecuadorian government and the Guayaquil & Quito Railway Company. The association made a sub-contract with the J. P. McDonald Company, of New York, who built 30 miles of the 57 miles of the mountain division and partially graded the remaining 27 miles. In September, 1902, 34 miles of the mountain division were in operation. The Ecuador Company of New Jersey was then formed by Robert C. Pruyn, of Albany, N. Y., and succeeded in opening the road to public traffic to a point 115 miles distant from Guayaquil. This was done in June, 1903. Another construction company was organized in November of last year by Mr. Harman and his associates. This is the Inca Company, which is incorporated in New Jersey and has entered into a contract with the Guayaquil & Quito Railway Company to complete the building of the road to Quito, the construction of which will open up what is claimed to be one of the richest agricultural territories, now having only the most primitive transportation facilities with the outside world.

THE ECUADOR-BOLIVIA RAILROAD CONTRACT.—Several American contracting concerns are figuring on a contract about to be awarded for the construction of a 300 mile railroad, which is intended to serve as an outlet by way of Chili for the rubber, cocoa, coffee, cinchona bark, etc., grown in the interior of Bolivia. The road is to run from Anca, the most northerly port in Chili, to La Paz, located on the south end of Lake Titicaca, the highest sheet of water in the world, it being at an altitude of some 12,000 feet above sea level. The line will pass through Ancara, 15,000 odd feet above the sea. The gradient in the Andean section will be about 3.75. The gage is to be 42 in. At present La Paz, which is the principal rubber center in Bolivia, has no railroad connection with the outside world. The nearest road is at Puno, on the northwest end of Lake Titicaca, about 100 miles distant. The Puno line connects with Mollendo, a Peruvian seaport.

Among those who are to submit bids for the construction work are the New York contracting firms of J. G. White & Co. and James Stewart & Company. The British contracting firm of S. Pearson & Son, Limited, as well as German concerns are also after the contract. Tenders are to be opened at the Chilian Ministry of the Interior at Santiago, January 2.

An Improved Pressed Steel Hand Car Wheel.

An improved design of pressed steel wheel for hand and push cars is illustrated herewith. By the use of special machinery the metal is so distributed as to increase its thickness in the flange and flange throat from ⅛ to 3/16 in. The metal plate used in making the wheel being ¼ in., its thickness is almost doubled at the above-mentioned points. The plates are sheared to circular form and



Pressed Steel Hand Car Wheel.

shaped at white heat under heavy hydraulic pressure. The plates are then reheated and run through a finishing machine, which effects the distribution of metal already mentioned. The metal is compressed in all processes of manufacture of the wheel, which is rolled in finishing, thus increasing the density and hardness and tensile strength of the metal and therefore its wearing qualities.

From the finishing machine the wheels pass at red heat to another hydraulic press holding male and female dies which size the wheels and make all of them of uniform diameter and periphery. The hub and flange are pressed into place hydraulically, and the riveting is done cold under similar pressure. The dish or the center and depth of the corrugations are made as great as possible to give maximum weight-bearing qualities and a better and stronger hub fit. The wheel presents an excellent appearance.

These wheels are made by the Kalamazoo Railway Supply Company, Kalamazoo, Mich. This company was reorganized during the past year with largely increased capital, and large additions have recently been made to the plant, including the latest improved tools for the machine shop.

The Recent History of Federal Control of Railroads in the United States.*

BY W. M. ACWORTH.

(*Continued from page 178.*)

To an Englishman, who knows that his own Railroad Commission has had power for thirty years not only to say that an existing rate is wrong, but practically to say that a certain other rate ought to be substituted for it, it is a little difficult to understand the alarm which the President's proposal has excited in the American railroad world. From the point of view of the public interest it is easy to find arguments against it. That the interference of our own Commission has tended to rigidity rather than adaptation to changing circumstances; that it has kept rates up that would naturally have come down to the benefit both of the railways and their customers; that, though the interference may possibly have been necessary, on the whole it has done more good than harm—all this I for one firmly believe. But, at least, there has been here no sign of a revolutionary upheaval of the *status quo*. And, indeed, in cases such as those of the Liverpool Corn Trade Association and the Southampton Docks the Court has pretty distinctly shown that any such upheaval is in the highest degree unlikely.

At the same time there can be no doubt whatever that the great majority of the railway men of America do regard the proposals of the President with the most serious apprehension. They mistrust, not without excuse, both the competence and the impartiality of the Interstate Commerce Commission. They point out that in at least two cases—subsequently, it is true, upset by the Supreme Court—the Commission has not shrunk from decisions which would have reduced to chaos the rates over the whole what is known as Southern Territory—a territory as large, and likely in fifty years to be as populous and important as France and Germany combined. With the experience of practical railroad men they ridicule the idea of five or seven men in Washington attempting to control—you will remember that the Commission has power to act of its own motion, without waiting till a complaint is brought before it—the rate-making on 220,000 miles of line, stretching over between three and four million square miles of country, and affecting a traffic which brings in a revenue of £250,000,000 per annum. It needs at present the best energies and intelligence of an army of traffic managers and freight agents scattered all over the country to deal with the 165,000 changes of rates, which, as I have already told you are put into force in one year. How can five men in Washington assume their functions? Further, the railroad men appeal to the Constitution of the United States, which says that no man shall be deprived of his property without due process of law, and they say that the property of railroad shareholders is in effect the right to receive reasonable rates for the carriage of passengers and goods. They refuse to admit that a branch of the executive government can oust the railroads themselves from the exercise of this right.

For my own part, while fully admitting that theoretically the position of the railroad companies is a very strong one, I cannot shut my eyes to the fact that theoretically the position of the President is a very strong one, too. The great railroad magnates appear to the ordinary citizen to be able to exercise almost unfettered contol of what the President calls the highways of commerce. In fact magnates, however great, are controlled by economic forces against which it would be vain for them to contend. But the public can hardly be expected to see this. Certainly our own Parliament has never shown much sign of seeing it.

How the struggle will end—and at present it is the dominant issue in American politics—no one can say. A short time back it looked as though the exposure by the railroads of the want of logic both in the President's message and in the Esch-Townsend bill would suffice to prevent any legislation at all. But since then, not only has the President's unique personal influence in the country been still further strengthened, but the scandalous disclosures in the Equitable Life case, in which one prominent railroad man is unfortunately involved, have given fresh strength to the feeling that great capitalistic organizations stand in need of better public supervision. In this country it would be safe to say that the Government would pass its bill. But the American constitution is so utterly different from ours; the balance of independent forces, which is its special feature, is so complicated in its working, that no one can foresee what the future will bring.

The most recent information that I have received is that there is some prospect of a compromise somewhat on the following lines. The Commission would be strengthened, it would cease to act as detective and prosecutor; its members would be increased in number, and their salaries made less inadequate. Power would be given

*A lecture delivered on Oct. 25, at the School of Economics, University of London.

to them, after complaint and a formal hearing, to fix a rate, which, in case of appeal by the railroads, would not go into effect until it had been approved by a court. But it is much questioned whether an Act framed on these lines would be constitutional. A court can only discharge judicial functions. Is it a judicial function to say what will be a reasonable rate next week? Further it is argued by very distinguished lawyers as follows: A court can interfere to disallow a rate made by the railroads which is so high as to be extortionate, or which creates an undue preference, for such rates are forbidden by statute. It can disallow a rate made by the Commission so low that it would amount to confiscation of the property of the railroad, for that is forbidden by the Constitution. Say that a rate of 40s. would be high enough to be extortionate, while a rate of 20s. would be so low as to be confiscatory. Between these points it is a matter of business discretion where the rate is to be fixed, and the exercise of business discretion is not constitutionally a judicial function.

In the discussion of this highly technical question it would obviously be futile for a foreigner to attempt to intervene. I have merely pointed out the difficulties that confront the President. I hope what I have said may help some of you to follow with a more understanding interest the manner in which in this coming winter he will endeavor to extricate himself from them.

German Agent for Japanese Government Railways.

The administration of the Japanese Government Railways, which has hitherto filled the bulk of its requirements for rails, bridge material, locomotives and other equipment in the United States, is reported to be negotiating with a view to place large contracts in Germany. Herr Baurat Rumschottel, formerly chief executive of the Berlin Machine Building Company, one of the largest concerns of its description in Europe, has been appointed Berlin agent for the Mikado's government lines. Herr Rumschottel is the first German to be selected for the position, hitherto Englishmen having been chosen.

The Manila and Dagupan.

The attention of the State Department has been called to the claim of the British owners of the Manila & Dagupan Railroad against the American Government. The claim amounts to about $1,500,000, and is for damages incurred during the insurrection in the Philippines, when the road was taken over by the army for military purposes. The justice of the claim has already been admitted by the United States Government, the question at issue being the amount of damages to be paid.

Cotton Rates in Texas.

In going to Galveston, the chief port of Texas, a large share of the cotton raised in the State passes through Houston, 50 miles north of Galveston, and much of it is stopped off there to be compressed. By reason of this and of the fact that Houston is itself something of a seaport, being on Buffalo Bayou, the city does a large business in cotton. To foster this Houston trade, the State Railroad Commission has made certain changes in rates. These facts are necessary to an understanding of the following editorial from the *Galveston News*, which we copy as an illustration of the beauties of state rate-making:

"The Railroad Commission of Texas is supposed to have been created for the purpose of preventing unfair discrimination in favor of one shipper or place as against another. It now stands committed to the very policy it was created to prevent. It taxes the cotton growers of Texas almost $1,000,000 a year to enable its one favored city, Houston, to continue 'in the cotton business.' For years this handicap has been put upon other cities to offset their natural advantages, and during these years Judge Reagan himself admitted the injustice of the differential in favor of Houston against other cities and against the cotton raisers.

"Until recently no commissioner who stands out for this anomaly in a State boasting a free, equal democratic policy has ever dared to let out of his lips the real purpose of the differential. Recently, on being cornered by the Beaumont *Journal*, which insists that the people of Beaumont are just as good as the people of Houston and ought to have equal privileges and similar treatment, Commissioner Colquitt let the cat out of the bag. He said in so many words: "Galveston has been appealing to the Commission to establish a straight mileage basis on cotton from all points in the State, giving Galveston the same rate which Houston enjoys. To do so would put Houston out of the cotton business, and that city would secure none of this traffic, as is evident from the experience Beaumont is now having.' * * * If it is just to leave Beaumont with the 'experience it is now having' and to leave a hundred other places with precisely similar troubles, then why is it not just to leave Houston to take her chances with the rest? If it is the duty of a Democratic Commissioner, who declaims against special privileges, to arbitrarily discount the natural advantages of other cities, and to arbitrarily, and at great cost to the people, make up for a lack of such advantages by manipulating freight rates in favor of Houston, why shouldn't he do as much for Beaumont? Isn't Beaumont Democratic?

"Commissioner Colquitt's remark about putting Houston out of the cotton business can mean only one thing: that the cotton producers of Texas are penalized to the tune of almost $1,000,000 to enable Houston to remain in the cotton business. Why not make similar efforts to keep any one of a hundred other cities in the cotton business."—*Galveston News.*

Manufacturing and Business.

The Canadian Locomotive Co. has applied to the Kingston City Council asking for an exemption of taxes for 20 years. If the exemption is granted the company proposes to increase the plant to double its present capacity.

The E. M. Dart Manufacturing Company, Providence, R. I., has received an order from the Baltimore & Ohio Railroad for Dart unions to be used on 200 locomotives now being built for that road by the American Locomotive Co.

Miss C. A. Baker, daughter of the late W. C. Baker, of New York, died on December 6. On the death of Mr. Baker, five years ago, Miss Baker took up the management of the Baker Car Heater, which she conducted most successfully until her death.

The Betts-Hayden Construction Co., of Norfolk, Va., has been incorporated with a capital of $200,000 to build docks, stations and do other construction work. The officers are: I. B. Betts, President, New York; M. C. Elliott, Secretary and Treasurer, Norfolk, Va.

An interesting exhibit at the Electrical Show, Madison Square Garden, New York, is that of the Electro-Dynamic Company, Bayonne, N. J., in which actual tests of the Moloney transformers are made. These tests show the various efficiencies of the transformers, such as low copper losses, and other interesting data.

The St. Louis Car Co., St. Louis, Mo., has recently booked large orders for its spiral journal bearings as follows: One thousand six hundred 4¼ in. x 8 in. and 3,200 5½ in. x 10 in. for the Burlington; 10,000 5½ in. x 10 in. for the Southern Pacific, and 1,600 5½ in. x 10 in. for the O., R. & N. There are also being delivered to the Pullman Company for the Burlington 8,000 5 in. x 9 in.; 200 5½ in. x 10 in. to the American Locomotive Co. for the B. & O.; and an order for 32,000 5 in. x 9 in. is being finished up for the Mo. P.

The Northern Engineering Works, crane builders, of Detroit, Mich., have been awarded the contract for the electric cranes required in the new steel casting foundry of the Monarch Coupler Co., Ltd., Detroit, Mich. There will be one 25-ton, 4-motor electric cradle crane, 50-ft. span, and one 10-ton, 4-motor standard crane, 50-ft. span. The Northern Engineering Works have also recently completed installing three electric traveling cranes in the plant of the Detroit Steel Casting Co., consisting of one 30-ton, 4-motor ladle crane, 70-ft. span, and two 10-ton, 3-motor electric cranes, 70-ft. span, and are now constructing for the same firm a 10-ton, 80-ft. electric gantry crane for yard service.

Iron and Steel.

Work has been started in the new billet and bloom mill of the Lackawanna Steel Co., Buffalo, N. Y., which will have a capacity of 40,000 tons a month.

The Alabama Steel & Wire Co., of Gadsden, and the Underwood Coal & Iron Co., of Blount County, according to reports, have beeen merged, under the name of the Southern Steel Co., of Gadsden, Ala., with a capital of $16,000,000. The officers of the new company are: Everett Schuler, President, Gadsden; George H. Schuler, Vice-President and Treasurer, Birmingham; R. D. Carver, Secretary, Birmingham. Besides these, the directors include: H. B. Schuler, Saratoga, Fla.; John Bindley, Pittsburg; C. VanCamp, Indianapolis; Moses Taylor and Robert D. VanCourtlandt, New York.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Canadian Society of Civil Engineers.

A meeting of the general section was held on December 14, at which the following papers were read:

"The Grand River, Ontario Peninsula. Effect of Deforestation and Swamp Drainage," by W. H. Breithaupt, M. Can. Soc. C. E.

"Military Engineering," by Captain T. E. Naish, M. Can. Soc. C. E.

"An Asphalt Plant for Walks and Crossings in Small Cities," by H. B. R. Craig, M. Can. Soc. C. E.

Western Railway Club.

The December meeting will be held at the Auditorium Hotel, Chicago, Tuesday evening, December 19. A paper on "The True Perspective of the Supply Department" will be presented by Mr. Geo. G. Yeomans, Assistant to First Vice-President, Wabash Railway.

PERSONAL.

—By the change of administration in the British Government, which took effect last week, the President of the Board of Trade is Mr. David Lloyd-George.

—Mr. F. R. Moulton, Superintendent of the Iowa and Minnesota division of the Chicago & North-Western, has been on that road since 1869, when he began as brakeman. He became conductor in 1877 and Trainmaster and Assistant Superintendent in 1890.

—Mr. C. J. Bechdolt, Superintendent of the central division of the Philadelphia, Baltimore & Washington, died at his home at Media, Pa., on December 5. Mr. Bechdolt was appointed to his last office in 1891, having been Assistant Engineer of the New York division of the Pennsylvania before that time.

—Mr. O. C. Post, General Auditor of the Delaware, Lackawanna & Western, died at his home in East Orange, N. J., on December 8, at the age of 52. His first railroad service was on the Baltimore & Ohio, as a clerk, where he later became Chief Clerk of the mechanical department. Previous to his last appointment on the Lackawanna, he was for ten years General Auditor of the Minneapolis & St. Louis.

—Mr. F. M. Smith, who was recently appointed Assistant Superintendent of the Western division of the Lake Shore & Michigan Southern, entered railroad service as operator on the Franklin division of that road in 1886. He was later transferred to the claim department of that division, being put in charge of it in 1898. Five years later he was made trainmaster of the Indiana, Illinois & Iowa, later taking the same position on the Western and Michigan divisions of the Lake Shore, where he remained until his present appointment.

—Mr. W. B. Knight, who was recently appointed General Freight Agent of the Missouri Pacific, was born in 1867. His first railroad service was in 1883, as clerk in the office of the auditor of passenger accounts on the Wabash, St. Louis & Pacific. In 1888 he went to the Atchison, Topeka & Santa Fe as tariff clerk, and the next year was appointed to the same position on the Missouri Pacific. He became chief tariff clerk on the same road in 1891, being promoted in 1897 to chief clerk of the traffic department. He was made Assistant General Freight Agent in 1889, and remained there until his present appointment.

—Mr. L. J. Seargeant, director of the Grand Trunk and formerly General Manager of that road, died recently in London, at the age of 80 years. He was born in England, and entered railroad service on the South Wales Railway. He was later Superintendent of the South Wales division of the Great Western, and then became General Manager and Secretary of the South Devon. In 1874 he came to this country as Vice-President of the Chicago & Grand Trunk, and Traffic Manager of the Grand Trunk. In 1891 he was made General Manager of the Grand Trunk and President of the Chicago & Grand Trunk, where he remained until 1896. He then returned to England, remaining a director of the company until his death.

—Mr. H. H. Vaughan, Superintendent of Motive Power of the Canadian Pacific, has been appointed to the new office of Assistant to the Vice-President of that road. It is understood that Mr. Vaughan has authority over motive power, rolling stock, stores, fuel and all electrical and mechanical matters. Mr. Vaughan was born in England, graduated from Kings College, London, served an apprenticeship at the works of Naysmith, Wilson & Co., at Patricroft, and after that worked for a short time as a machinist at the Gorton Shops of the Manchester, Sheffield & Lincolnshire; also at the Nine Elms Works of the London & Southwestern. In 1891 he came to the United States and entered the shops of the Great Northern as machinist. He served as draftsman till 1894, when he was made Assistant Engineer of Tests. In 1895 he became Mechanical Engineer, and while in this position designed a number of important devices, among which is the present engineer's valve of the New York Air Brake Company. In 1898 he was appointed Mechanical Engineer of the Philadelphia & Reading, and two years later took the management of the shops and mechanical engineering department of the Q. & C. Company in Chicago. In 1902 he went to the Lake Shore & Michigan Southern as Assistant Superintendent of Motive Power. In 1904 he was appointed Superintendent of Motive Power of the Canadian Pacific. On this road Mr. Vaughan has had the difficult task of organizing a large new railroad shop, which of itself is a sufficient undertaking for the short time he has been there. This, however, is only a part of the record which he has made since he has been at Montreal, which has now placed him, while still young, in a leading position in the motive power world.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—M. M. Ansley has been appointed General Freight Agent of this road and of the Western of Alabama, succeeding W. E. Knox, resigned.

Baltimore & Ohio Southwestern.—J. B. Carothers, Superintendent of the Ohio division, has been transferred to the Illinois division with office at Washington, Ind., and E. R. Scoville, Superintendent of the Illinois division, has been appointed Superintendent of the Ohio division with office at Chillicothe, Ohio.

Buffalo & Susquehanna.—C. P. Clark, General Manager, has been elected also Second Vice-President.

Butte County.—A. M. Mowry has been elected Treasurer, succeeding J. K. Robinson.

Canadian Pacific.—H. H. Vaughan, Superintendent of Motive Power, has been appointed Assistant to the Vice-President, with office at Montreal.

George McL. Brown, Superintendent of Sleeping, Dining and Parlor Cars, has been appointed General Passenger Agent of the Canadian Pacific's steamship service, and G. A. Ringland has been appointed Assistant General Passenger Agent of the steamship service, both with offices at Montreal, Que.

In the rearrangement of the Sleeping, Dining and Parlor Car Department of the Western Lines, S. C. Sykes is appointed Assistant District Superintendent at Vancouver. The office of District Superintendent has been abolished. There are now sleeping and dining car agents at Winnipeg, Moose Jaw, Calgary and Cranbrook. Mr. Bell, District Superintendent for the Western Lines, reports to the Superintendent of the Department at Montreal, as heretofore. This corrects an error in the statement published in this department October 27, page 129.

Chicago, Burlington & Quincy.—J. W. Mulhern, Division Superintendent at Hannibal, Mo., has been appointed Division Superintendent at Galesburg, Ill., succeeding R. L. Porter, resigned. A. V. Brown, Superintendent of Terminals at Kansas City, succeeds Mr. Mulhern. J. P. Cummings succeeds Mr. Brown.

Jacob Kastlin, Master Mechanic at St. Joseph, Mo., has resigned. W. W. Lowell, Master Mechanic at Brookfield, Mo., succeeds Mr. Kastlin. E. W. Fitt, Assistant Superintendent of Motive Power, has been appointed Master Mechanic at Alliance, Neb., succeeding F. J. Kraemer, assigned to other duties, and the office of Assistant Superintendent of Motive Power has been abolished.

J. R. Haynes has been appointed Assistant Purchasing Agent, with office at Chicago, Ill.

Chicago, Rock Island & Pacific.—B. F. Yoakum has been elected Chairman of the executive committee, succeeding Robert Mather, resigned.

A. Hermany has been appointed Auditor of Passenger Traffic of this road, the Chicago, Rock Island & El Paso and the St. Louis, Kansas City & Colorado, succeeding D. Laughlin, resigned, with office at Chicago, Ill.

Cincinnati, Hamilton & Dayton.—T. A. Sweeney, Division Superintendent at Wellston, Ohio, has been appointed Division Superintendent at Dayton, Ohio, succeeding I. F. White, assigned to other duties. J. M. Scott, Trainmaster at Lima, Ohio, succeeds Mr. Sweeney.

Cleveland, Cincinnati, Chicago & St. Louis.—D. W. Pardee, Assistant Secretary, has been elected Secretary, succeeding E. F. Osborn, who becomes Assistant Secretary, with office at Cincinnati.

H. J. Rhein, General Passenger, Ticket and Baggage Agent of the Lake Erie & Western, has been appointed General Passenger Agent of the C., C., C. & St. L., witn office at Cincinnati, Ohio. C. C. Clark, General Agent at Columbus, Ohio, has been transferred to Indianapolis, with the same title, where he assumes the duties of S. D. McLeish, Assistant General Passenger Agent, resigned. See Lake Erie & Western.

Colorado Southern, New Orleans & Pacific.—G. A. Clark, Vice-President and General Manager of the Tennessee Central, has been elected Vice-President of the C. S., N. O. & P.

Delaware & Hudson.—W. A. Moyer has been appointed Industrial Agent, with office at Albany, N. Y.

Arthur Kemper, Superintendent of Car Service, has been appointed Superintendent of Transportation. D. F. Wait, Superintendent of the Champlain division, has been appointed Superintendent of the Susquehanna division with office at Albany. A. T. Benjamin, heretofore Superintendent of the Saratoga and Susquehanna divisions, has been appointed Superintendent of the Saratoga and Champlain divisions, with office at Albany. S.

D. Curtis has been appointed Assistant Superintendent of the Champlain division, with office at Plattsburg, N. Y. D. H. Kelley, Trainmaster at Albany, has been appointed Assistant Superintendent of the Saratoga division. J. P. Wallace has been appointed Assistant Superintendent of the Susquehanna division, with office at Albany.

W. C. Ennis, Master Mechanic at Oneonta, N. Y., has been appointed Superintendent of Car Shops at Carbondale, Pa. G. S. Edmonds, Mechanical Engineer, succeeds Mr. Ennis.

Detroit, Toledo & Ironton.—F. A. Durban has been elected Vice-President, with office at Zanesville, Ohio.

Dunkirk, Allegheny Valley & Pittsburg.—See New York Central Lines.

Erie.—W. H. Willis, Inspector of Signals, has been appointed Signal Engineer, with office at Jersey City, succeeding C. H. Morrison, assigned to other duties.

G. W. Gould has been appointed Superintendent of the Employment Bureau, succeeding W. C. Hayes, transferred, with office at Jersey City.

Fort Worth & Denver City.—W. W. Miller has been appointed Division Superintendent at Crildress, Tex., succeeding George Geiger, resigned. See Kansas City Southern.

Illinois Central.—This company now operates that portion of the Tennessee Central between Nashville, Tenn., and Hopkinsville, and the jurisdiction of the general officers of the Accounting, Treasury, Operating and Traffic departments has been extended over this territory.

William Smith, Jr., Assistant General Freight Agent, has been transferred from Evansville, Ind., to Nashville, Tenn.

Illinois, Iowa & Minnesota.—The office of J. C. Duffin, Secretary and General Superintendent, has been removed from Dekalb, Ill., to Rockford, Ill. C. W. Davis has been appointed Car Accountant, with office at Rockford.

Indiana Harbor.—See New York Central Lines.

Indiana, Illinois & Iowa.—See New York Central Lines.

International & Great Northern.—J. D. Trammel, Chief Engineer, has been given an indefinite leave of absence on account of the sickness of a member of his family. O. H. Crittenden has been appointed Resident Engineer at Palestine, Tex.

Interoceanic of Mexico.—F. W. Baldwin, Division Superintendent of the National of Mexico, at Acambaro, has been appointed Superintendent of Transportation of the Interoceanic of Mexico, succeeding J. H. Feehan, with office at Mexico City.

Great Northern.—H. L. Shepard has been appointed Assistant Superintendent of the Breckenridge division, with office at Breckenridge, Minn., succeeding R. C. St. John, resigned.

C. T. Walters, Master Mechanic at Minot, N. Dak., has been appointed Master Mechanic at Havre, Mont., succeeding F. M. Fryburg, resigned. A. B. Ford, Traveling Engineer, with office at Great Falls, Mont., succeeds Mr. Walters. See Montana Central.

Kansas City Southern.—George Geiger, Division Superintendent of the Fort Worth & Denver City, has been appointed Superintendent of the Southern division of the K. C. S., and also Superintendent of the Texarkana & Fort Smith, with office at Texarkana, Tex., succeeding T. E. Jarrett.

Kingston & Pembroke.—W. R. Baker, Assistant to the President of the Canadian Pacific, has been appointed Vice-President and General Manager of the K. & P., succeeding C. W. Spencer, resigned.

Lake Erie & Western.—S. D. McLeish, hitherto Assistant General Passenger Agent of the Cleveland, Cincinnati & St. Louis, has been appointed General Passenger Agent of the L. E. & W., with offices at Indianapolis, Ind. See New York Central Lines.

Long Island.—C. L. Addison, General Superintendent, has been appointed Assistant to the President, effective January 1. J. A. McCrea, hitherto Superintendent of the Pittsburg, Cincinnati, Chicago & St. Louis, at Cincinnati, succeeds Mr. Addison, with office at Long Island City.

Louisiana & Northwest.—W. R. Haynes has been appointed Superintendent, succeeding C. H. Beardsley. R. R. Joslin has been appointed Auditor, succeeding A. R. Porterfield, with office at Magnolia, Ark. The office of Car Accountant, held by C. I. Miller, has been abolished.

Macon & Birmingham.—S. F. Parrott, Acting Vice-President, has been elected Vice-President.

Millen & Southwestern.—The general offices of this company have been removed from Monte, Ga., to Graymont, Ga.

Missouri Pacific.—J. Russell, Division Superintendent at Atchison, Kan., has been appointed Superintendent of the Omaha division, with office at Omaha, Neb. G. W. Inge, Superintendent at Kansas City, has been appointed Assistant Superintendent of the Omaha division, with office at Kansas City, Kan. The Western division has been abolished.

S. P. Pryor has been appointed Purchasing Agent, with office at St. Louis. W. G. Nixon remains Purchasing Agent as heretofore.

Missouri Southern.—N. H. Davis has been appointed Auditor, with office at Chicago, Ill.

Mobile, Jackson & Kansas City.—E. S. Brooks has been appointed Purchasing Agent, with office at Mobile, Ala.

Montana.—F. T. Robertson, General Superintendent and Chief Engineer, has been appointed General Manager, with office at Helena, Mont.

Montana Central.—F. M. Fryburg, Master Mechanic of the Montana division of the Great Northern, has been appointed Master Mechanic at Great Falls, Mont., succeeding C. M. Prescott, resigned. See Great Northern.

National of Mexico.—H. L. Newton, Superintendent of Terminals at Mexico City, has been appointed Superintendent of the Pacific division, with office at Acambaro, Mex. D. R. Caffey succeeds Mr. Newton. See Interoceanic.

New York Central Lines.—D. C. Moon, General Superintendent of the Lake Shore & Michigan Southern, and J. J. Bernet, Assistant General Superintendent, have been appointed to the same offices on the Dunkirk, Allegheny Valley & Pittsburg and the Indiana, Illinois & Iowa. Mr. Moon is also General Superintendent of the Lake Erie & Western.

T. J. Cook is General Freight and Passenger Agent of the Indiana Harbor and the Indiana, Illinois & Iowa. F. G. Hopper is Assistant General Freight Agent of the Indiana Harbor.

Northern Pacific.—E. J. Pearson, Chief Engineer, has resigned. W. L. Darling, Chief Engineer of the Pacific, and recently Chief Engineer of the Chicago, Rock Island & Pacific, succeeds Mr. Pearson. See Pacific.

Pacific.—W. L. Darling, Chief Engineer, has resigned. E. J. Pearson, Chief Engineer of the Northern Pacific, succeeds Mr. Darling. See Northern Pacific.

Pacific Coast.—J. W. Smith has been elected Assistant Secretary and General Auditor, with office at Seattle, Wash. This company operates also the Columbia & Puget Sound.

Pennsylvania.—D. C. Chase has been appointed Superintendent of Steam Towing, of the United Railroads of New Jersey division.

Peoria & Pekin Terminal.—W. T. Irwin has been elected President, succeeding T. J. Miller; Guy W. Talbot, General Manager, has been also elected Vice-President; H. M. Danforth has been elected Treasurer, succeeding P. L. Saltonstall. The offices of all are at Peoria, Ill. G. F. Nevins, General Freight Agent, has been also appointed Auditor.

E. S. Walker is Master Mechanic, with office at Peoria.

Philadelphia, Baltimore & Washington.—The office of Division Superintendent at Media, Pa., made vacant by the death of C. J. Bechdolt, has been abolished and its duties will hereafter be performed by E. F. Brooks, General Superintendent.

Rio Grande Western.—John Hickey, Master Mechanic at Salt Lake City, Utah, has resigned owing to ill health. William Donald succeeds Mr. Hickey.

Salt Lake & Mercur.—J. L. Conkling, Auditor, has resigned.

Santa Fe Central.—W. C. Hagan, Secretary, has been elected also Treasurer, succeeding T. L. Clark.

Frank Zink has been appointed Acting Superintendent of Motive Power, with office at Estancia, N. Mex., succeeding G. H. Shone.

Seaboard Air Line.—Townsend Scott has been elected to the board of directors.

Southern.—This company now controls that portion of the Tennessee Central between Harriman, Tenn., and Nashville, including the Carthage and Wilder branches, and operates this part of the road as the Nashville division of the Southern. W. H. Gatchell has been appointed Superintendent of the Nashville division. H. L. Miller, Division Freight Agent at Knoxville, Tenn., has been appointed Assistant General Freight Agent, with office at that place.

Tehuantepec National.—C. Greene, Trainmaster, has been appointed Superintendent, succeeding P. H. Kilpatrick. H. P. Durham has been appointed Superintendent of Motive Power and Machinery, succeeding Louis Greaven. E. J. Ford has been appointed Car Accountant, succeeding W. H. Ware. The offices of all are at Rincon Antonio, Mex.

Tennessee & North Carolina.—J. B. Hart, Vice-President, has been elected President, succeeding J. J. Holloway, with office at Clarksburg, W. Va. Norman James succeeds Mr. Hart, with office at Baltimore Md.

Tennessee Central.—See Illinois Central, and Southern.

Texarkana & Fort Smith.—See Kansas City Southern.

Wabash.—F. H. Tristram, Assistant General Passenger Agent at Pittsburg, Pa., has been transferred to Chicago. See Wheeling & Lake Erie.

Wheeling & Lake Erie.—R. F. Kelly, who temporarily succeeded F. A. Palmer as Assistant General Freight Agent of the Wabash at Chicago, has been appointed Assistant General Freight Agent of the Wheeling & Lake Erie and the Wabash-Pittsburg Terminal at Pittsburg, Pa., succeeding F. H. Tristram, transferred.

LOCOMOTIVE BUILDING.

The Great Northern has ordered 50 locomotives from the Baldwin Works.

The Susquehanna & New York has ordered one locomotive from the Baldwin Works.

The New York, Philadelphia & Norfolk has ordered two locomotives from the Baldwin Works.

The Colorado & Southern, it is reported, will shortly close contracts for upwards of 50 locomotives.

The Wabash is asking prices on locomotives of the prairie, consolidation and six-wheel switching types.

The West Virginia Central & Pittsburg has ordered three locomotives from the Lima Locomotive Works.

The Chicago, Rock Island & Pacific, it is reported, has ordered 25 locomotives from the American Locomotive Co.

The Wisconsin Central has ordered eight saddle tank locomotives from the Davenport Locomotive Works. These locomotives will be used in construction work and are for January, 1906, delivery.

The St. Louis & San Francisco, as reported in our issue of December 8, has ordered 25 4-6-0 locomotives from the American Locomotive Co., and 20 0-6-0 locomotives from the Baldwin Works. The 4-6-0 engines will weigh 180,000 lbs., with 138,000 lbs. on drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 63 in.; working steam pressure, 200 lbs. The tender will have a capacity of 6,000 gallons of water. The 0-6-0 engines will weigh 120,000 lbs.; cylinders, 19 in. x 26 in.; diameter of drivers, 51 in. The tender will have a capacity of 4,500 gallons of water.

The Louisiana & Arkansas has ordered two simple 10-wheel (4-6-0) locomotives from the Baldwin Locomotive Works, for January, 1906, delivery, and two second-hand locomotives from Fitz-Hugh, Luther Co. The 10-wheel locomotives will weigh 149,500 lbs., with 121,500 lbs. on the drivers; cylinders, 20 in. x 26 in.; diameter of drivers, 56 in.; straight boiler, with a working steam pressure of 200 lbs.; heating surface, 2,306 sq. ft.; 316 Tyler tubes, 2 in. in diameter and 13 ft. long; firebox, 116¾ in. long and 41⅛ in. wide; grate area, 33.3 sq. ft.; tank capacity, 5,000 gallons of water, and coal capacity, 10 tons. The special equipment includes: Westinghouse-American air-brakes, Keasbey & Mattison boiler lagging, Tower couplers, Adlake headlights, Monitor injectors, More-Jones journal bearings, Jerome piston rod packings, Ashton safety valves, Leach sanding devices, Detroit sight-feed lubricators, French springs and Crosby steam gages.

The Chicago & Eastern Illinois, as reported in our issue of December 8, has ordered 28 simple consolidation (2-8-0), five simple Atlantic (4-4-2), 19 six-wheel (0-6-0) switching and three eight-wheel (0-8-0) switching locomotives from the Baldwin Locomotive Works. The consolidation locomotives will weigh 182,000 lbs., with 162,000 lbs. on the drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 55 in.; working steam pressure, 200 lbs.; tank capacity, 7,500 gallons of water, and coal capacity, 13 tons. The Atlantic locomotives will weigh 180,000 lbs., with 103,000 lbs. on the drivers; cylinders, 21 in. x 26 in.; diameter of drivers, 78 in.; working steam pressure, 200 lbs., and tank capacity, 7,500 gallons of water. Ten of the six-wheel switching locomotives will weigh 160,000 lbs.; cylinders, 20½ in. x 26 in.; diameter of drivers, 51 in., and working steam pressure, 200 lbs. The other nine six-wheel switching locomotives will weigh 142,000 lbs.; cylinders, 20 in. x 26 in.; diameter of drivers, 50 in. and tank capacity, 5,000 gallons of water. The eight-wheel switching locomotives will weigh 220,000 lbs.

The Vandalia, as reported in our issue of December 8, has ordered four simple Atlantic (4-4-2), five simple mogul freight (2-6-0), and three six wheel (0-6-0) switching locomotives from the American Locomotive Co., for June, 1906, delivery. The Atlantic locomotives will weigh 184,000 lbs., with 108,000 lbs. on the drivers; cylinders, 21 in. x 26 in.; diameter of drivers, 79 in.; straight boiler, with a working steam pressure of 200 lbs.; 351 tubes, 2 in. in diameter and 15 ft. 10⅞ in. long; Pennsylvania R. R. specification firebox, 96⅛ in. long and 75¼ in. wide; grate area, 50.2 sq. ft.; tank capacity, 7,500 gallons of water, and coal capacity, 24,000 lbs. The mogul locomotives will weigh 182,500 lbs., with 156,500 lbs. on the drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 63 in.; straight boiler, with a working steam pressure of 200 lbs.; heating surface, 2,935 sq. ft.; 390 tubes, 2 in. in diameter and 161⅞ in. long; Pennsylvania R. R. specification firebox, $108^{3}/_{16}$ in. x 41¾ in.; grate area, 52 sq. ft.; tank capacity, 7,500 gallons of water, and coal capacity, 26,000 lbs. The switching locomotives will weigh 144,000 lbs.; cylinders, 20 in. x 26 in.; diameter of drivers, 51 in.; straight boiler, with a working steam pressure of 180 lbs.; heating surface, 1,955.1 sq. ft.; 311 tubes, 2 in. in diameter and 131 in. long; Pennsylvania R. R. specification firebox, 108⅛ in. x 69¼ in.; grate area, 31.4 sq. ft.; tank capacity, 5,000 gallons of water, and coal capacity, 15,000 lbs. The special equipment for all includes: Westinghouse air-brakes, Pennsylvania R. R. specification axles, Alexander bell ringers, Franklin Manufacturing Co.'s boiler lagging, "Creco" or Davis brake-beams, Tower couplers, Nathan injectors and sight-feed lubricators, U. S. metallic piston rod packings for Atlantic locomotives, and Hayden piston and valve rod packings for mogul and switching locomotives, Coale's safety valves, Union Spring Co.'s springs, Latrobe driving, truck and tender wheel tires and cast-steel wheel centers.

The Lehigh Valley, as reported in our issue of December 8, has ordered 40 locomotives, as follows: Twenty 10-wheel fast freight locomotives from the American Locomotive Co.; five 10-wheel fast freight locomotives, five Pacific type passenger locomotives and 10 Mikado type slow freight locomotives from the Baldwin Works. The 10-wheel fast freight engines will weigh 199,200 lbs., with 150,200 lbs. on drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 68½ in.; straight, wide firebox boiler, with a working steam pressure of 205 lbs.; total heating surface, 3,269 sq. ft.; 378 charcoal iron tubes, 2 in. in diameter x 15 ft. 8 in. long; firebox, 120⅛ in. x 102 in.; grate area, 85 sq. ft. The tender will have a capacity of 7,500 gallons of water and 12 tons of coal. The Pacific type engines will weigh 220,000, with 140,000 lbs. on drivers; cylinders, 22 in. x 28 in.; diameter of drivers, 76½ in.; straight, wide firebox boiler, with a working steam pressure of 210 lbs.; total heating surface, 3,858 sq. ft.; 311 charcoal iron tubes, 2¼ in. in diameter x 20 ft. long; firebox, 120 in. x 96 in.; grate area, 80 sq. ft. The tender will have a capacity of 6,500 gallons of water and 12 tons of coal. The Mikado locomotives will weigh 235,000 lbs., with 182,000 lbs. on drivers; cylinders, 22½ in. x 28 in.; diameter of drivers, 55½ in.; straight, wide firebox boiler, with a working steam pressure of 200 lbs.; total heating surface, 3,556 sq. ft.; 318 charcoal iron tubes, 2½ in. in diameter x 18 ft. long; firebox, 120 in. x 105¼ in.; grate area, 87.7 sq. ft. The tender will have a capacity of 8,000 gallons of water and 8½ tons of coal. The specifications for all the above engines will include: Westinghouse air brakes, Snow bell ringers, Keasbey & Mattison magnesia boiler lagging, Diamond special brake-beams, Tower all-steel couplers Glazier headlights, Hancock injectors, Magnus Metal Co.'s journal bearings, U. S. metallic piston and valve packings, Consolidated safety valves, Leach sanding devices, Detroit sight-feed lubricators, Railway Steel Spring Co.'s springs, Ashcroft steam gages, Latrobe driving, truck and tender wheel tires and cast steel wheel centers for driving wheels.

CAR BUILDING.

The Fort Smith & Western is in the market for 200 box cars.

The Texas & Pacific is building 50 combination coal and ballast cars in its own shops.

The Atchison, Topeka & Santa Fe has ordered three dining cars from the Pullman Co.

The Tacoma Eastern is figuring on the purchase of 125 flat cars of 70,000 lbs. capacity.

The Intercolonial has ordered 25 box cars of 60,000 lbs. capacity from the Rathburn Co.

The Louisiana & Arkansas has ordered two cabooses from the American Car & Foundry Co.

The Chicago City Railway, it is reported, has ordered 200 cars from the J. G. Brill Company.

The Mexican Central is reported in the market for upwards of 1,000 additional freight and box cars.

The Chicago, Indianapolis & Louisville has ordered nine passenger cars from the American Car & Foundry Company.

The Chicago & North-Western, it is reported, will shortly place orders for a large amount of additional freight equipment.

The Canadian Northern has ordered 1,000 box cars, 250 flat cars and 13 passenger cars from Rhodes, Curry & Company.

The St. Louis Southwestern, it is reported, has ordered 750 box cars, 450 flat cars and 250 stock cars from the American Car & Foundry Co.

The Virginia & Carolina Coast has ordered 275 box cars, four caboooses, nine passenger coaches, two baggage cars and three combination baggage and mail cars from the American Car & Foundry Co.

The Chattanooga Electric Railway Co., Chattanooga, Tenn., has ordered six 28-ft. cars from the St. Louis Car Co., to be mounted on St. Louis Car Co.'s trucks.

The Wabash, as reported in our issue of December 8, is asking prices on a large number of wooden box cars and steel underframe gondola cars. The wooden box cars will measure 40 ft. long and will be of 80,000 lbs. capacity. The steel cars will also be 40 ft. long, but will be of 100,000 lbs. capacity.

The Maine Central has ordered eight passenger coaches from the Pullman Co. for delivery in the spring of 1906. These cars will measure 60 ft. 5 in. over sills x 9 ft. 8 in. wide. The bodies and underframes will be of wood. It has also ordered two baggage cars from the Pullman Co. These will measure 60 ft. long x 9 ft. 9 in. wide.

The Northern Electric Co., Chico, Cal., has ordered four interurban cars from the Niles Car & Manufacturing Co., for January, 1906, delivery. These cars will weigh 70,000 lbs., and measure 56 ft. long, 9 ft. 2 in. wide and 13 ft. high, over all. The special equipment includes: Niles Car & Manufacturing Co.'s bolsters, brake-beams, brasses, door fastenings, doors and vestibules, Peckham brake-shoes, journal boxes, springs and trucks, Westinghouse air-brakes, Gould couplers, Pantasote curtain fixtures, Miner draft rigging, St. Louis enclosed arc headlights and Schoen wheels.

The Union Pacific and the Southern Pacific have ordered 600 refrigerator cars of 60,000 lbs. capacity from the American Car & Foundry Co., for August, 1906, delivery. These cars will weigh 38,000 lbs., and measure 39 ft. 10¾ in. long, 8 ft. 2¾ in. wide and 7 ft. 6¼ in. high, inside measurements. The special equipment includes: Simplex bolsters, National-Hollow brake-beams, Christie brake-shoes, Hewitt Manufacturing Co.'s brasses, Climax couplers, Miner tandem draft rigging, National Malleable Castings Co.'s journal boxes, Railway Steel Spring Co.'s springs, arch-bar trucks and American Car & Foundry Co.'s wheels.

The Cornwall Railroad, Lebanon, Pa., has ordered two passenger coaches and one combination passenger and baggage car from the J. G. Brill Co. for May, 1906, delivery. The passenger coaches will have a capacity for 66 persons and will measure 62 ft. long x 9 ft. 10 in. wide over all. The bodies and underframes will be of wood. The passenger and baggage car will have a capacity for 41 persons and will also measure 62 ft. long x 9 ft. 10 in. wide over all. The special equipment for these cars will include: Wooden bolsters with iron fillers, wooden brake-beams, American Brake Shoe & Foundry Co.'s brake-shoes, Westinghouse air-brakes, J. G. Brill brasses, Janney couplers, Burrow's pinch handles curtain fixtures, Pantasote curtain material, Adams & Westlake Co.'s lights and Lobdell wheels.

The Wilkes-Barre & Hazleton, as reported in our issue of December 8, has ordered 10 semi-convertible passenger cars from the Jewett Car Co., for March, 1906, delivery. These cars will weigh 40,000 lbs. approximately, and measure 40 ft. 3 in. long, 8 ft. 11 in. wide and 11 ft. 10 in. high, over all. The special equipment includes: Standard Steel Works axles, J. G. Brill Co.'s bolsters, brake-beams, dust guards and trucks, American Car & Foundry Co.'s brake-shoes, Westinghouse air-brakes, Jewett Car Co.'s couplers, door fastenings, doors, draft rigging and seats, Hartshorn spring rollers and Acme cable curtain fixtures, Pantasote curtain material, Consolidated Car Co.'s heating system, Symington journal boxes and Standard Steel Works forged rolled steel wheels. Other specialties are: That all cars will be equipped with Climax portable headlights.

The Boston & Maine has ordered 500 box cars and 1,000 drop-end gondola cars from the Laconia Car Works for March, 1906, delivery. The box cars will have a capacity of 60,000 lbs. and will weigh 32,900 lbs. They will be 36 ft. long x 8 ft. 6 in. wide x 8 ft. high, all inside dimensions. The bodies and underframes will be of wood. The gondola cars will have a capacity of 60,000 lbs. and will weigh 26,800 lbs. They will measure 34 ft. long x 8 ft. 1 in. wide x 3 ft. high, all inside dimensions. The bodies and underframes will be of wood. The special equipment for both classes includes: Hammond wrought-iron axles, 4¼ in. x 8 in. journals, pressed steel bolsters, simplex brake-beams, cast-iron brake-shoes, Westinghouse air-brakes, Gould couplers, Miner tandem draft rigging, Murphy roofs, Crucible Steel Co.'s springs, pressed steel trucks (pedestal type), and 33-in., 600-lbs. Laconia Car Co.'s cast-iron wheels.

BRIDGE BUILDING.

Arkansas.—A bill has been introduced in both Houses of Congress authorizing the Rock Island, Arkansas & Louisiana Railroad to build bridges over the Ouachita river, and other navigable rivers in Arkansas.

Evarts, S. Dak.—The Chicago, Milwaukee & St. Paul, it is said, has given a contract to Kansas City parties for building a railroad bridge over the Missouri river at this place on its proposed extension to the West.

Knoxville, Tenn.—Plans are being made for building a viaduct over the railroad tracks at Asylum avenue. The proposed structure will cost about $35,000 and will be similar to the Clinch avenue viaduct now nearing completion, which cost $80,000.

Lyndon, Kan.—Bids are wanted January 2 by the County Commissioners for building steel bridges in Osage County as follows: One 102 ft. long, one 42 ft. long and two each 100 ft. long; all with 14-ft. roadway on stone abutments. John W. Yeoman is County Clerk.

New York, N. Y.—The Board of Estimate and Apportionment has approved the plans for the new Hendrik Hudson memorial bridge to be built at Spuyten Duyvil, and has appropriated $1,000,000 for the preliminary work. The estimated cost of the entire structure will be $2,025,000, and it is to be completed in time for the proposed anniversary celebration in 1909.

Oregon.—Bills were introduced on December 6 in both Houses of Congress authorizing the Portland & Seattle Railway to build a bridge over the Columbia river.

Salem, Mass.—Essex County Commissioners have voted to ask bids for putting up a new bridge over Danvers river connecting Salem with West Beverly, estimated to cost $100,000; also for a bridge over Squam river at Gloucester to cast about $55,000.

Troy, N. Y.—Washington and Saratoga Counties will pay a share of the cost of building a bridge over the Hudson river at Sandy Hill to cost about $60,000.

Washington, D. C.—The bill authorizing a Memorial bridge over the Potomac river between Washington and Ashington, Va., was introduced in the House of Representatives December 6. The bill has been before Congress for several sessions.

Wilson, N. C.—Bids are wanted December 18 by the Board of County Commissioners for building a steel bridge to consist of two spans each 80 ft. long with a 16-ft. roadway over Moccasin river, in Wilson County. John W. Hays, 3 South Adams street, Petersburg, Va., is the engineer who will furnish information.

Yankton, S. Dak.—In the U. S. Senate on December 7 a bill was introduced authorizing the Winnipeg, Yankton & Gulf Railroad Co. to build a combined railroad and highway bridge over the Missouri river, at Yankton.

Other Structures.

Baltimore, Md.—The Baltimore & Ohio has given a contract to the McLean Contracting Co. for building a large dock at Locust Point. The new structure will be practically a duplicate of pier No. 5 recently built for the North German Lloyd Co., and will be 975 ft. long by 165 ft. wide, with two decks carrying two tracks each.

Birmingham, Ala.—A recent fire at the shops of the Tennessee Coal & Iron & Railroad Co. caused a loss of about $20,000.

Bloomington, Ill.—A contract, it is said, has been given by the Cleveland, Cincinnati, Chicago & St. Louis to W. C. Carr & Son at $25,0000 for building its passenger station here.

Buffalo, N. Y.—The shops of the Union Dry Dock Co. and the Erie transfer and freight house, 1,500 ft. long, on the north side of Ganson street, were destroyed by fire December 8; loss about $130,000.

Charlottetown, P. E. I.—Bids are wanted by D. Pottinger, General Manager of the Intercolonial Railway, Moncton, N. B., December 26, for building a stone passenger station at Charlottetown.

Hoboken, N. J.—The Delaware, Lackawanna & Western has let a contract for putting up its new terminal station to the Snare-Triest Co., of New York.

Norfolk, Va.—Application will soon be made by the Norfolk & Western for permission to build a steel coal pier at Lambeth Point at a cost of between $300,000 and $400,000.

Schenectady, N. Y.—The Schenectady Railway Co. has under consideration the building of new machine shops adjoining its Mc-

Clellan street car barn. The proposed structure will be of brick, 100 ft. by 200 ft.

WICHITA, KAN.—The Missouri Pacific has bought about 25 acres of land on the northern boundary of the city to be used as a site for its new shops, which are to take the place of those in the southern section of the town. The plans include a 28-stall roundhouse, on which work is to be commenced at once.

WILMINGTON, DEL.—Revised plans of the new Pennsylvania station to be built at Front and French streets have been completed. The proposed structure will be of brick 193 ft. x 167 ft.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

CANADIAN NORTHERN.—An officer of this company is reported as saying that the $6,000,000 borrowed by President Mackenzie in England will be used for building the Hudson's Bay branch from Erwood to Fort Churchill, on Hudson's Bay. Contracts for ties are now being let at Erwood. Surveys have been completed and work will be commenced as early in the spring as possible.

CANANEA, YAQUI RIVER & PACIFIC.—See Southern Pacific.

CHICAGO & NORTH-WESTERN.—This company has filed application for permission to build an extension from Lakewood northeast in Oconto County, Wis., a distance of six miles.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—This company, which recently gave a contract to W. J. Oliver & Co., of Knoxville, Tenn., to double track 12 miles of its road from Pineknot, Ky., to Flat Rock, has given an additional contract to the same party to double track the line from Pineknot south to Helenwood, Tenn., a distance of 18 miles. (December 1, p. 175.)

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Bids are wanted by William M. Duane, Superintendent at Cincinnati, Ohio, December 28, for double track work and grade reduction on the St. Louis division betwen Indianapolis and Delmar, Ind. The work includes the excavation of 1,370,000 cu. yds., and building a double track roadbed, and relocating the line between Delmar and Lena, which requires the removal of 2,275,000 cu. yds. of earth; also for double tracking the roadbed and relocating the line on the Cincinnati division between Middletown and Miamisburg. This calls for the excavation of 600,000 cu. yds.

COLUMBUS & ERIE (ERIE).—Contracts have been given by this company for building its proposed road from Lakewood, N. Y., at the south end of Chautauqua lake, west to Columbus, Pa., 20 miles. The first section, from Lakewood to Niobe, Pa., will be built by Burke Bros., of Scranton, Pa., and the remainder of the road from Niobe to Columbus, by R. C. Hunt, of New York. The sections are of about equal length. The new line will be double track and will furnish a low-grade line for main line trains. The cost of the work will be about $500,000. (See Erie, Sept. 29, p. 103.)

DEEPWATER.—See Tidewater below.

DETROIT TERMINAL.—Under this name a company has been incorporated in Michigan, with a capital stock of $2,000,000, to build a belt road outside and around the city of Detroit, the entire length of the proposed line being about 25 miles. It will follow closely the city line, and will connect with all steam and electric roads running into the city, and is expected to open up much new territory for manufacturing industries. The directors are: Joseph H. Berry, Col. Frank J. Hecker, Charles B. Warren, William G. Smith, William B. Cady and Alfred Hopper, all of Detroit.

ERIE.—See Columbus & Erie above.

FLORIDA WEST SHORE (S. A. L.).—A contract, it is said, has been given by this company to C. H. Davis, of Manatee, Fla., for building an extension from its southern terminus at Fruitville, south to the end of Gasparilla Island, at Boca Grande Inlet, and to Charlotte Harbor, a distance of about 50 miles. It is expected to have the work completed by July of next year.

HARRIMAN LINES.—The *Wall Street Journal*, quoting the Director of Maintenance and Operation of the Harriman Lines, gives a statement of a total of 863 miles of branches and extensions planned by the various companies. Of this total the Union Pacific has 201, the Oregon Short Line 140, the Oregon Railroad & Navigation Co. 135, and the Southern Pacific 387 miles. Details of the new lines, most of which have been already mentioned in the *Railroad Gazette*, will be found under the names of the separate companies.

MANISTEE & GRAND RAPIDS.—This company has completed an extension of its line to Marion, Osceola County, connecting the Ann Arbor Railroad at that point with the Grand Rapids & Indiana Railroad at Tustin, and with Lake Michigan at Manistee.

MEXICAN ROADS.—A concession has been granted by the Mexican Government to Rafael Davila and Salvadore Gardenas Pena, of Monterey, to build a railroad from Allende in the State of Coahuila north to Zaragoza, about 15 miles. The proposed line will connect at Allende with the International. The terms of the concession require that the road shall be completed and in operation within two years.

NEW YORK-PHILADELPHIA (ELECTRIC).—This company is said to be asking bids for building nine miles of electric railroad from Milltown, N. J., to a point south of Metuchen, for which contracts will shortly be let. This company is the holding corporation of the consolidated street railway lines between Camden and Jersey City, and it proposes to build an air line to be operated by electric power from Elizabeth to Camden by way of Trenton. The first three miles of the new road from Elizabeth west are nearing completion. Contracts for the section from Metuchen to New Brunswick will be let as soon as the second section is under way.

OKLAHOMA CITY, DENVER & GULF.—Incorporation has been granted this company in Oklahoma with a capital of $19,425,000 to build a railroad from Shreveport, La., through Texas; the Choctaw, Chickasha and Seminole Nations in Indian Territory, and through Pottawatomie, Cleveland, Oklahoma, Canadian, Logan, Kingfisher, Blaine, Custer, Dewey, Woods, Day, Woodward and Beaver Counties in Oklahoma; thence to Denver, about 777 miles. The directors include: C. G. Jones, J. L. Wilken, E. Overholser, G. W. Caric and H. J. Edwards, all of Oklahoma City.

OMAHA & SOUTHWESTERN.—See Union Pacific.

OREGON RAILROAD & NAVIGATION.—The following two branches cover the 135 miles of new line to be built, referred to under the heading Harriman Lines:

(1) A branch from Elgin, Ore., to Joseph, Ore., 63 miles, grading on which has just begun. This is to develop the Wallowa Valley, now a stock raising country, but rich in agricultural possibilities.

(2) A line from Riparia, Wash., to Lewiston, Idaho, 72 miles, now being graded. This will be used jointly by the Northern Pacific, which in turn will build on to Grangeville, Idaho, 50 or 60 miles from Lewiston, its line being used jointly by the O. R. R. & N. The latter line will be built next spring, giving a through line from Riparia to Grangeville, a fine wheat country. There is nothing competitive about this building, the Harriman line builds half, the Hill line the other half, and they both will use the whole jointly.

OREGON SHORT LINE.—The 140 miles of new branches and feeders mentioned under the heading Harriman Lines consists of the following:

(1) An extension under the name of the St. Anthony Railroad, from Marysville, Idaho, to Dwelles Inn on the western boundary line of Yellowstone Park, 75 miles up the Henry Fork of the Snake river. The 65-mile stage ride from Monida to Dwelles, near the lower Geyser Basin, will thus be eliminated. To Marysville the new line will run through an agricultural section and beyond is a heavy timber country. The line to Marysville will be completed by Dec. 15.

(2) A line from Garland, Utah, to Malad City, Idaho, 30 miles, through an agricultural section in Utah and southern Idaho. There is a large beet sugar plant at Garland.

(3) Thirty-five additional miles of spurs in southern Idaho and northern Utah to the beet fields. The longest of these spurs is from Logan, Utah.

ST. ANTHONY.—See Oregon Short Line.

SAN FRANCISCO, IDAHO & MONTANA.—An officer writes that the route of this proposed road is from Butte, Mont., southwest through Salmon City, Boise, and Caldwell, Idaho, and Mason City, Nev. (Old Camp McDurmit), thence to Winnemucca, Nev., with an extension from Mason City west to the northern part of California Valley. Track laying will commence early next year. Contracts for part of the grading are let and others are being let. The section between Boise and Winnemucca runs through practically desert prairie lands, except the Boise basin and the Owyhee range on the boundary of Idaho and Oregon, where the grade will be 1.6 per cent. The balance of the section will be 0.6 per cent. The work includes a steel bridge over the Snake river. It is the plan to build 210 miles from Boise to Winnemucca by January, 1907. William Peyton Mason, 4 Elks Building, Minneapolis, Minn., is President, and C. E. Bryant, Boise, Idaho, is Chief Engineer. (November 24, p. 167.)

SEABOARD AIR LINE.—See Florida West Shore above.

SONORA (SO. P.).—According to the *Jalisco Times*, this company announces that the concession granted to it by the Mexican Government for its proposed line from Guaymas to Guanajuato is as follows: The company is to receive $10,000 (U. S. currency) a mile. The total amount shall not exceed $7,500,000, or enough to cover 750 miles. The line will be about that length and the payments will be made in government bonds and in cash, to be distributed over a period of ten years. During the first 15 years, the government agrees not to allow the building of a parallel track within a zone extending about 205 miles on either side of the proposed road. For the first ten years, the company will be permitted to import

free of duty all material for construction, machinery for its shops, engines and cars. The Mexican Government also provides, in order to encourage exports, that railroad rates shall be 50 per cent. less on this class of goods when the shipping distance is 156 miles or over. About 50 engineers are now at work making surveys for this line. (November 3, p. 144.)

Southern Pacific.—The 387 mies of new branches and feeders described under Harriman Lines as to be built by the Southern Pacific, include the following:

(1) A line from Drain, Ore., on the San Francisco-Portland line, midway between Eugene and Roseburg, westerly down the valley of the Umpqua, thence southerly to Coos Bay, on the Pacific Coast, 82 miles. This line has just been begun, and is to be completed in 1906. It runs through a timber and agricultural country.

(2) A line from Natron, Ore., up one of the forks of the Willamette across the Cascades, south to Klamath Lake in southern Oregon, where the government is to open a wide area by irrigation. This line will also develop a fine timber section and will be 152 miles long.

(3) Extension 16 miles long from Hazen, Nevada, on the main line, southeasterly, into the heart of the irrigated country. The entire country round Carson Lake in Nevada will have water next year from the government's Carson project. It is now a sage brush desert.

(4) A line 15 miles long from Santa Cruz, running up from the ocean coast 15 miles on the Pacific coast, to proposed large cement works. As a result of government irrigation plans and private operations, there is more demand for cement now in California than three large factories can supply.

(5) A line through lower California in the irrigated districts, south of the boundary line and back to Yuma on the main line, making on the main line a loop of 70 miles, of which 40 or 45 miles are completed.

(6) Under the name of the Cananea, Yaqui River & Pacific, in Mexico, a 52-mile line has been surveyed from Batamotal near Guaymas on the Gulf of California, southeasterly to the valley of the Yaqui. This also is a rich agricultural country, but eventually the new line will serve many mines in the foothills of the Sierra Madre mountain. This line is part of the Southern Pacific concession in Mexico. The Greene properties are in northern Sonora, and it is not improbable that Harriman and Greene interests later on will find a way of connecting.

See Sonora above.

Tidewater.—An officer writes that contracts have been let for building the Tidewater and Deepwater Railways, as follows: Section A: From Southern Railway crossing near Hurt, Va., westerly 20 miles, to J. G. White & Co., 43 Exchange Place, New York. Section B: From Meherrin, Va., easterly 22 miles, to A. & C. Wright & Co., and W. R. Bonsal & Co., Hamlet, N. C. Section D-2: From Brookneal easterly 6½ miles, to Butler Bros. Construction Co., 1170 Broadway, New York. Section E: From Brookneal westerly 20 miles, to Carpenter, Frazier, Boxley & Co., Clifton Forge, Va. Section F: From Southern Railway crossing near Hurt, Va., easterly 32 miles, to Lane Bros. Co., Esmont, Va. Section G: From Roanoke easterly 23 miles, to D. A. Langhorne & Co., Alderson, W. Va. Sections H, I, J, K, L: From Roanoke to Bluestone River, 112 miles, to MacArthur Bros. Co. and Arthur F. MacArthur, Chicago, Ill. Work will be commenced at once and the entire road completed for operation December 1, 1907. (December 8, p. 184.)

Union Pacific.—The 201 miles of new construction mentioned under Harriman Lines include the following:

(1) The Omaha cut-off, which is being built under the name of the Omaha & Southwestern from South Omaha, Neb., to Lane, 11.5 miles. The existing line is 20.43 miles long. Estimated cost $2,000,000. Substitutes light for very heavy grades, and double for single track.

(2) A line being built from Hershey on the main line near North Platte, Neb., up the valley of the North Platte to Northport, 150 miles, through the corn belt.

(3) An extension from Topeka on the Kansas City main line northwesterly to Onaga, Kan., 40 miles, through an agricultural section. This line connects at Onaga with another Union Pacific line to Kansas City.

(4) Double tracking 100 miles in southern Wyoming and in spots where the coal traffic is heavy, and also 70 miles from Kansas City to Topeka. The latter strip has been in progress some time but is about completed. Work on the other 100 miles has just begun.

Vancouver, Victoria & Eastern.—The grading contracts let to the sub-contractors by J. W. Stewart, who has the work on this road, from Seims, Shields & Co., are in the form of stations of 100 ft. each, the following being the names of the contractors and their stations from Midway, B. C., to the international boundary: Burns & Jordan, 259 stations; Johnson & Anderson, 97 stations, including 850-ft. tunnel; Johnson & Welch, 142 stations; D. J. Brown, 58 stations; D. A. Rankin, 62 stations; Boie Bros. & Moran, 66 stations; George Chew, 104 stations; Burns & Jordan, 96 stations, including 400-ft. tunnel; Johnson & Welch, 82 stations; T. J. Gallagher, 123 stations; E. A. Carleton, 65 stations; P. S. Hughes, 144 stations; Gorman & Pierce, 124 stations. The total distance from Midway to the boundary is 30 miles, the length of the line south of the line is 47 miles, and from the point where it again enters Canada to the Keremous, 17 miles, and from Keremous to Princeton, 48 miles. Plans are now being made to ask for bids for the line between Keremous and Princeton. Passenger trains will soon run over the branch from Curlew to Midway, the line having been completed. James H. Kennedy is Chief Engineer, with headquarters at Midway, B. C.

Western Pacific.—An officer writes that this company has let contracts for building 359 miles and has 11 miles under construction in California, and has also let contracts for 110 additional miles in Utah, divided as follows: From Oakland, Cal., to the California-Nevada state line, 370 miles, and from near Salt Lake City, Utah, to a point near the Utah-Nevada line, 110 miles. The contractors are: The Utah Construction Co., of Ogden, Utah, 110 miles in Utah and 174 miles in California; E. B. & A. L. Stone, of Oakland, Cal., 185 miles in California. The company is also making surveys from the Utah-Nevada state line to the Nevada-California line, 429 miles.

Wichita Mountain Traction.—Incorporation has been granted a company under this name, with $250,000 capital, to build an electric railroad from Roosevelt, Okla. Ter., east, traversing Kiowa, Comanche and Caddo Counties, to Apache, a distance of 50 miles. The incorporators include: W. R. McKnight, E. A. McCoulter, C. L. Johnson and Guy H. Parker, of Roosevelt, and John A. McKeene, of Hobart. The office of the company will be at Hobart.

RAILROAD CORPORATION NEWS.

Cincinnati, Hamilton & Dayton.—Two committees have been formed to protect the holdings of security owners. The first is for the $8,500,000 4 per cent. refunding gold bonds of 1954. This committee consists of J. N. Wallace, Frederick Strauss and Mark T. Cox. J. N. Wallace is a member of the second committee which represents the holders of the $15,000,000 4½ per cent. collateral trust notes of 1908. (See Pere Marquette.)

Milwaukee Electric Railway & Light Company.—Spencer Trask & Co. and N. W. Harris & Co., New York, have jointly purchased $2,000,000 refunding and extension mortgage 4½ per cent. gold bonds of 1931 of this company, which owns 103 miles of road and controls all the gas and electric lighting companies of Milwaukee. The total authorized issue of these bonds is $20,000,000 of which $8,000,000 is reserved to retire the following bonds: $500,000 West Side Street Railway 5 per cent. bonds of 1909; $6,500,000 Milwaukee Electric Railway & Light Co. consolidated 5 per cent. bonds of 1926; $1,000,000 Milwaukee City Railway first mortgage 5 per cent. bonds of 1908. Of the remaining $10,000,000, $9,000,000 is reserved in the treasury of the company until January 1, 1907, when it may be issued at the rate of $1,000,000 a year for extensions and improvements.

Newark Passenger Railway.—N. W. Harris & Co., New York, are offering $400,000 first consolidated mortgage 5 per cent. gold bonds of this company. The total amount authorized is $6,000,000. The company operates 83 miles of road in and about Newark, N. J., and its entire $6,000,000 capital stock is owned by the Consolidated Traction Co., which guarantees the above-mentioned bonds. The mortgage securing this issue now constitutes a first lien on the property.

New York Central & Hudson River.—It is reported that the Andrews syndicate and this company have bought the $6,500,000 common stock of the Rochester Railway & Light Co., at $125 a share. The light company controls the Rochester Railway Co., which operates 146 miles of road in and about Rochester, N. Y.

Northern Securities.—A dividend of 5 per cent. on the $3,954,000 "stubs" has been declared, payable on January 10, to holders of record of December 22.

Pere Marquette.—A shareholders' protective committee has been formed to protect the interests of the holders of the common and preferred stock of this company. Nathaniel Thayer is chairman. It is said that the Pere Marquette shareholders have the most to fear in the present receivership. The Cincinnati, Hamilton & Dayton, on March 1, 1905, guaranteed 4 per cent. dividends on the $12,000,000 Pere Marquette preferred and 5 per cent. on the $14,145,500 common stock, and the present C., H. & D. receivership may break this guarantee.

Seaboard Air Line.—This company has made an equipment mortgage to Blair & Co. for $1,279,460 to provide for 15 locomotives and 1,015 cars, to be built by various companies.

Union Pacific.—The convertible bonds now outstanding amount to $19,233,000, and the outstanding common stock is $176,796,900.